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USSR Report

SCIENCE AND TECHNOLOGY POLICY

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CONTENTS

REVIEW OF WORK FOR AUTOMATION IN SCIENTIFIC RESEARCH, PLANNING

Moscow EKONOMICHESKAYA GAZETA in Russian No 33, Aug 83 p 2

[Survey prepared by the Main Administration of Computer Equipment and Control Systems of the USSR State Committee for Science and Technology: "Automation in Scientific Research and Planning"]

[Text] Automation of scientific research, planning and design, and technological work on the basis of electronic computer equipment is, at the present time, a means of radically changing the very process of planning and designing structures, machines and technologies. The decisions of the 26th Party Congress point out the need to expand automation of planning--design in scientific research work with the application of electronic computer equipment.

Under the current five-year plan, a special-purpose comprehensive scientific and technical program is being implemented: "Creation and Development of Automated Systems for Scientific Research (ASNI) and Systems of Automated Planning (SAPR) With the Application of Standard Equipment and Measurement-Computation Complexes."

From Simple to Complex

The ASNI's are used for processing experimental information in order to obtain mathematical models of the objects, phenomena and processes being studied. The results should be received in form which can subsequently be applied for control, planning or prediction.

In particular, mathematical models obtained with ASNI's serve in SAPR's for optimal planning of objects of modern technical equipment. Here small and mini-computers perform various scientific and technical calculations, process data from scientific research, do stand and field tests of models, carry out geophysical prospecting for minerals, perform medical diagnosis, and so forth. Medium-sized and large computers are necessary for creating comprehensive ASNI's and SAPR's that serve large scientific research or planning organizations.

In such modern areas of technology as aviation and space travel, radio electronics and machine building, ASNI's and SAPR's are used as interconnecting systems that support the entire cycle along the chain "research--planning--testing--technological preparation of production."

It should be emphasized that modern technical equipment becomes complicated extremely rapidly. This tendency is objective in nature and arises with an increase in the capacity of machines and technological processes and increased speeds, productivity, handling capacity and other technological characteristics. Multibranch industrial complexes are developing, cities are growing, transportation systems are branching out, and energy systems are embracing entire continents. All these extremely complicated objects must be planned as a unified complex and joined into a single, smooth-running system which interacts efficiently with the natural environment. Modern technical equipment today sets for the planner and designer such complicated tasks that to carry them out by the traditional "manual" methods is becoming impossible.

Of no small importance is the fact that tht planning of increasingly complicated objects must be done without increasing the number of planning and design organizations or the number of specialists working in them. Even now, the difficulties in controlling large planning collectives and the outdated methods of preparing design and technological documentation are leading to an appreciable prolongation of the time periods for developments.

A most important problem in modern planning work is the need to obtain optimal decisions. If one pays attention to the diversity of ties and limitations that must be taken into account when preparing an immense number of variants of technical decisions, it becomes obvious that it is impossible to solve problems of optimal planning by ordinary means.

These difficulties can be overcome only on the basis of extensive utilization of mathematical modeling, powerful computer methods and electronic computers in planning, design and technological organizations. Automation of scientific research and planning is thus becoming a most important factor in accelerating scientific and technical progress in industry and construction.

The Major Effect

In keeping with the special-purpose comprehensive program, more than 250 ASNI's and SAPR's are being created, which will then be "reproduced" in various branches. The major effect from the application of ASNI's and SAPR's arises with automation of the creative functions of man, when in the early stages of development one selects the principles of operation and the structure and optimal characteristics of the planned object.

The interaction between the planner and the model of the object through the electronic computer creates a qualitatively new situation in planning. Man in the process of dialogue with the computer can creatively analyze not one

or two, but dozens of various variants, achieve optimization, model the behavior of the object in the external environment and, finally, correctly select the best decision.

Practice shows that in those organizations where these systems are already operating they have achieved a 1.5-2-fold acceleration of research and development. When utilizing ASNI's and SAPR's the material-intensiveness of the planned items and objects decreases by five-ten percent, and expenditures on construction and operation of optimally planned objects decrease by ten-fifteen percent.

For example, the utilization of electronic computers when planning objects of the Fedorovskoye, Teplovskoye and Savuyskoye petroleum deposits in Western Siberia made it possible to reduce capital investments by 22.6 million rubles as the result of selecting the optimal variants of general plans for building.

When planning the Oskol'skoye Electrometallurgical Combine they managed to save 6.4 million rubles as a result of optimizing the decisions of the general plan, and in addition to this they reduced expenditures of materials and elements by ten-twelve percent. A fairly simple optimization program made it possible to save 300 tons of metal as compared to the normative when constructing the Dzhambul-Frunze LEP-220.

The USSR Ministry of Power and Electrification has created an ASNI for processing sea seismographic data when searching for petroleum and gas, reducing the time of investigation to one-half-two-fifths the previous level, with an eight-fold increase in the volume of useful information. Mobile systems for seismographic prospecting and well-logging units make it possible to obtain basic information about the structure of the beds directly in the process of prospecting. The time of processing the results of field investigations is also reduced hundreds of times over and, the main thing, they are presented in the form of the cross sections of the deposits, which makes it possible to judge the occurrence and quality of the minerals.

Diffractrometric complexes for crystallographic investigations which were developed at institutes of the USSR Academy of Sciences make it possible to reduce the time for structural determinations for crystals of average complexity from two-three years to 50-100 hours.

In machine building there are such effective systems as the SAPR for asynchronic electric engines in the VNIIEM of the Ministry of the Electrical Equipment Industry, the SAPR of large electrical machines in the Leningrad Elektrosila electrical machine building association, the SAPR for centrifigal pumps in the VNIIgirdomash of the Ministry of Chemical Machine Building, the systems for designing metal cutting machine tools in the Ministry of the Machine Tool and Tool Building Industry, and many others. SAPR's are also applied in industrial and civil construction organizations.

It should be emphasized that it is not only the direct economic effect that is important. In a number of branches such as electronics, nuclear physics, space and ecology research, it is generally impossible to obtain new results without modern systems.

Problems of Introduction

Analysis shows that in spite of the high effectiveness of automation in scientific research and planning, ASNI's and SAPR's are slow in making their way into a number of branches. In the Ministry of the Automotive Industry SAPR's are being created in only fifteen organizations, and the situation is the same in the Ministry of the Machine Tool and Tool Building Industry and the Ministry of Electrical Equipment Industry. In the Ministry of Heavy Machine Building, they intend to introduce these systems in only two subdivisions. In the Ministry of Machine Building for Animal Husbandry and Fodder Production, they have not yet organized work for SAPR's for items of the branch. It would be expedient for the managers of these and a number of other ministries to devote the most serious attention to realizing the possibilities of automation.

In work for creating ASNI's and SAPR's, it is necessary to solve a number of problems which predetermine to a significant degree the effectiveness of their introduction. We are speaking first of all about the overall methodology of planning and designing.

The traditions which have taken form throughout many years in planning work and they system for forming and preparing documentation are intended for manual operations and the utilization of such ordinary means as the drawing board and the logarithm tables. Correspondingly, the mathematical models, the algorithms for calculation and the reference data are simplified to the point where they can be used "by hand." Of course, transferring to electronic computers such simplified models and methods of calculation does not produce the proper effect. At the same time these methods are frequently normative and have been approved as branch standards. Therefore, the branches must conduct persistent and planned work for improving normatives, standards and methods so that they can provide for a high scientific and technical level of developments with the help of ASNI's and SAPR's.

Another problem pertains to the creation in the branches of modern bases and data banks which are especially adapted both for interaction with the SAPR's and for serving subscribers who use ordinary methods of planning. The creation of automated data banks is an important and timely problem. In machine building and radio electronics it is necessary to deal with hundreds of thousands of kinds of materials and items.

The list of products in the electronics industry, for example, is updated so rapidly that ordinary brochures and catalogues are not published until two or three years after the time the items have been delivered to production.

A similar situation has arisen in construction with standard blocks, panels and other elements of construction parts. Therefore the creation of automated data banks which contain detailed technical specifications about the products produced by the ministries and departments is a most important national economic task.

Scientific research institutes and higher educational institutions are playing a larger role in work for creating ASNI's and SAPR's. It must be emphasized that when creating these systems, one must solve not only branch organizational and technical problems, but also fundamental scientific problems. They should include the general theory of operations, a number of areas of mechanics, resistance of materials, applied and computer mathematics, and the theory of control.

Actually all the main engineering disciplines acquire new possibilities of development on the basis of the application of more complete mathematical models and powerful electronic computers. The leading role in this multifaceted work should be played by scientists not only of scientific research institutes, but also of VUZ's.

The main thing consists in instilling habits of automation of reasearch, planning and design in engineers of all the main technical specialities. It is necessary for the programs and textbooks for these disciplines to contain sufficiently complete information about the application of electronic computers for engineering calculations and planning in the corresponding area of technical equipment. Of course, such extensive restructuring of engineering education is a labor-intensive and lengthy process which requires primarily the development of the corresponding habits in the professor and teaching personnel. Therefore a decisive role in training personnel should be played by the link between the VUZ's and the enterprises of organization and industry and construction at which work in the area of SAPR is being conducted. It is important for the USSR Ministry of Higher and Secondary Specialized Education to devote the most serious attention to this.

As experience has shown, in such complicated systems as ASNI's and SAPR's, individual algorithms and programs do not play a special independent role; they must be combined into subsystems with components of technical, informational and organizational software in order to carry out effective planning procedures. There is now a need to organize a State Archive of Algorithms and Programs (GFAP) in the work for automating scientific research and planning.

The concepts of algorithms and programs themselves are no longer adequate. It would be more correct to speak about branch archives of standard subsystems and components of ASNI's and SAPR's, which are part of the unionwide supply. The provisions developed by the State Committee for Science and Technology concerning the GFAP take these circumstances into account to a certain degree. The GFAP is a distributed structure which relies on the head organizations of

the ministries and departments. The tasks consist in enabling these head organizations to accumulate and develop the experience in creating and applying ASNI's and SAPR's which exists in the branches.

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CSO: 1814/31

WORK OF RSFSR AND BELORUSSIAN GOSPLANS REPORTED

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 9, Sep 83 pp 123-124

[Text] In the RSFSR Gosplan

At a meeting of the RSFSR State Planning Committee, they considered the draft of the Comprehensive Program for Scientific and Technical Progress of the RSFSR for 1986-2005. The draft was developed by the RSFSR Gosplan in conjunction with the RSFSR Gosstroy, the RSFSR Ministry of VUZ's, and institutions of the USSR Academcy of Sciences, with the enlistment of involved ministries and departments of the RSFSR, krayispolkoms, oblispolkoms and the Moscow and Leningrad city ispolkoms, with the participation of numerous scientific, planning, design and technological organizations and industrial enterprises. The organization and coordination of the work for preparing the draft were done by the Republic Scientific Council on Problems of Scientific-Technical and Socio-economic Prognostication of the USSR Academy of Sciences and the RSFSR Gosplan as well as fourteen regional and thirteen branch commissions of it.

The program was prepared using multivariant approaches when calculating the growth rates of the national income and the ratios in its utilization. It envisions increasing the effectiveness of the republic economy as a result of accelerated growth of the active part of fixed capital, the determination of the priorities and expediency of the scientific and technical policy, its maneuverability, rapid increase in the results of scientific activity, and a clear-cut list of concrete areas for the development of various regions of the Federation. Economic requirements for scientific and technical progress are formulated in the program. When it was being developed, attention was devoted to questions of demography, environmental protection and social development, taking into account the conditions and the nature of economic activity in each of the regions of the republic.

When considering the draft of the program, they considered the key problems in it related to more extensive utilization in the national economy of the discoveries made by fundamental science, improvement of the system of training scientific personnel, increased coordination of the activity

of scientific research organizations located on the territory of the RSFSR; ways of reducing the application of manual labor and increasing the production of agricultural products in the various zones of the republic; questions of social restructuring of rural areas; problems of the development and introduction of reduced-waste and waste-free technologies, and product quality; and methods of accounting for the economic effectiveness of variants of the program.

Concluding the discussion of the draft of the program, the chairman of the RSFSR Gosplan, N. I. Maslennikov, noted that the program represents a qualitatively new stage in the improvement of the system of planning the economic and social development of the economy of the Russian Federation. It is based on actual proportions, tendencies and the level of development of the republic's economy, and the condition and predictions about resources, including labor resources; it earmarks measures for eliminating unfavorable factors and meeting economic requirements in the development of scientific and technical progress; it takes into account the conditions and the nature of the economic activity in the European Center and the Urals, in Siberia and the Far East, and in the zone of the North.

Taking into account the remarks and suggestions that were made, the RSFSR State Planning Committee approved the draft of the Comprehensive Program for Scientific and Technical Progress of the RSFSR for 1986-2005 (with a breakdown of the five-year plans) as part of the consolidated section and regional sections for ten economic regions of the USSR, and also for Moscow and Moscow oblast, Leningrad and Leningrad oblast, the agro-industrial complex of the nonchernozem zone, the European North and Kaliningrad oblast.

At the meeting of the RSFSR Gosplan a decision was also adopted concerning the creation of a permanent section for considering materials and preparing proposals for improving the development and utilization of norms for the expenditure of material and technical resources.

In the Belorussian Gosplan

At the meeting of the board of the Belorussian SSR Gosplan, they considered the draft of the Comprehensive Program for the Scientific and Technical Progress of the Belorussian SSR for 1986-2005. It was developed by the Belorussian Academy of Sciences, the Belorussian Gosplan and the republic Gosstroy with the participation of scientific research, planning and design organizations, enterprises and production and scientific production associations, ministries and departments of the USSR and the Belorussian SSR, under the leadership of the Republic Scientific Council for Problems of Scientific-Technical and Socio-economic Prognostication of the Belorussian SSR Academy of Sciences and the Belorussian SSR Gosplan.

The drawing up of the Comprehensive Program was based on the special-purpose approach. It envisions: the determination of the goals of socio-economic development in the republic; the establishment of assignments for producing products and rendering services for the various branches of the national economy; the evaluation of resource limitations; the determination of alternatives of scientific and technical progress in branches in order to achieve the goals that have been set; development of models for coordinating goals and alternatives of scientific and technical progress; the evaluation of the results of calculations, the clarification of pre-requisites, goals and normatives; the development of a final variant of branch predictions of scientific and technical progress which provides for high and stable rates of growth of public production with limited increases in labor resources; the determination of generalizing indicators of the socio-economic development of the Belorussian SSR for the twenty-year period.

From the results of the discussion of the Belorussian SSR Academy of Sciences, it was suggested that the coworkers also continue work on the program in the area of more profound substantiation for the measures for the utilization of the achievements of science and technology in order to increase the efficiency of public production. The board instructed the administrations and divisions of the Belorussian SSR Gosplan to participate actively in the work of problem and branch commissions of the aforementioned republic scientific council in order to provide for more profoundly scientifically substantiated developments of variants for the technical development of the branches of the national economy.

The board of the Belorussian Gosplan also considered the system for the distribution of productive forces and comprehensive development of the Belorussian SSR national economy during the period up to the year 2000 which was made more precise with the participation of divisions of the Belorussian SSR Gosplan and the Belorussian Scientific Research Institute of Problems of Administration of the National Economy of the Belorussian SSR Gosplan, taking into account the remarks in the oblast plans and the Minsk city plan. It was noted in the board decision that individual parts of the system must be worked out in greater detail (questions of accelerating the growth of labor productivity; utilizing labor resources; increasing volumes of commodity turnover and monetary income, and improving their commercial support; determining the main indicators of the economic and social development of the administrative regions and large cities; comprehensively utilizing raw and processed materials, and so forth).

At the board meeting attention was devoted to the need to strengthen the coordination of the work of the head organizations and coworkers who are engaged in the development of the Comprehensive Program for Scientific and Technical Progress of the Belorussian SSR, the system for the distribution of productive forces and comprehensive development of the national economy of the Belorussian SSR during the period up to the year 2000, predictions and recommendations for further improvement of territorial

organization of the republic and development of rural settlements, and the optimal variant of the Belorussian SSR fuel and energy complex for the period up to the year 2000, and other economic problems.

11772

CSO: 1814/14

LOCAL AGENCIES TO HAVE GREATER ECONOMIC CONTROL

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 9, Sep 83 pp 96-99

[Article by V. Vykhrushch, deputy chairman of the Ternopol Oblast ispolkom, chairman of the Ternopol planning commission: "Comprehensive Special-Purpose Programs"]

[Text] In keeping with the decree of the CPSU Central Committee, the USSR Council of Ministers and the Presidium of the USSR Supreme Soviet, "On Further Increasing the Role of the Soviets of People's Deputies in Economic Construction," the functions of the local soviets of people's deputies have been considerably expanded in controlling the economies of the oblasts, krays and cities. This has brought about a need to search for new forms and methods of development of the economies of the regions, and also of control over the course of fulfillment of the national economic plans.

The special-purpose comprehensive programs that envision the solutions to the most important individual problems are an important lever in control of the region's economy by the local soviets and party agencies. Taking this into account, the Ternopol obkom of the Communist Party of the Ukraine and the oblispolkom have adopted a decision to develop a comprehensive special-purpose program: "Labor," "sugar," "transportation," "services," "commodities," "construction materials" and "scientific and technical progress." Participating in development of these programs were scientific research organizations, VUZ's, production associations and large enterprises of the main branches of the oblast economy. Head enterprises and organizations were determined for the formation and implementation of the programs. The work for drawing up the programs was headed by the oblast soviet for socio-economic planning.

The main developers have prepared elaborate formulations of the main goals, subgoals and tasks of the programs, and have earmarked the enterprises and organizations which are to be enlisted in the development and implementation of the latter. The corresponding organizational plans have been drawn up. The head developer determined all those who are to carry out

the program assignments, the policy and time periods for completing the work, the volumes and sources of financing, and the necessary methodological materials, forms and indicators. He has also provided organizational and scientific-methodological guidance of the activity of all organizations enlisted in the development of the programs. A system for control over implementation has been included as a part of each program. All oblast programs are intended for 1981-1985.

The special-purpose programs were approved by a decision of the ispolkom of the oblast soviet people's deputies. The assignments were given to the enterprises, organizations and rayons. Information about the course of the fulfillment of the program is considered at meetings of the oblispolkom along with the results of the fulfillment of the plan for economic and social development.

Practice confirms the need for active control over the implementation of comprehensive special-purpose programs. Taking this into account, the ispolkom of the oblast soviet of people's deputies in September 1982 adopted a decision which establishes the stages and policy for control over the implementation of the program. When developing a system of control, they determined the most important quantitative indicators of the program, the functions of all levels of administration, the forms of control, the time periods for it, and also the specific officials who are responsible for the implementation of the assignments set in the programs.

It is necessary to establish personal responsibility for the implementation of special-purpose programs. For example, the first deputy chairman of the oblispolkom is responsible for the implementation of the special-purpose program "Labor." The planning commission and the division for labor of the oblispolkom are obligated to analyze each month the statistical indicators of the reports concerning the utilization of labor resources and they must report on the results to the ispolkom each quarter. Once every half year, the question of incresing the efficiency of labor is considered at a meeting of the commission for utilization of labor resources under the oblispolkom, and a formal decision is made. The policy for accounting for and analyzing the fulfillment of the assignments of the program has been determined (at the levels of the oblasts, rayons, cities and enterprises) in terms of norm setting for labor, improving its conditions, increasing the skills of the workers, and so forth.

In order to coordinate the activity of the agencies of local soviets and departments which are located on the territory of the oblast and exercise control of the fulfillment of decisions of the party and government and assignments in the comprehensive special-purpose programs, a control information group (within the limits of the overall number of the staff of the ispolkom) has been created, and it provides practical assistance to these organizations.

The oblast has devoted a great deal of attention to the development of the program "Scientific and Technical Progress." It has earmarked the most important areas for the development of scientific progress in the oblast, plans for scientific research, assistance for scientific and technical progress in the region's economy, the strengthening of ties between science and production, the solutions to technical problems, and the introduction into production of the achievements of science and technology. The most important section of the program is the subprogram for reducing the use of manual labor.

Under the Eleventh Five-Year Plan through the joint efforts of the VUZ's, scientific research and design organizations, associations and enterprises, it is intended to conduct 125 fundamental research and applied scientific research projects and technical developments. A significant place in the program is allotted to researchers and developers on problems of the development of the agro-industrial complex in the oblast, including improvement of the structure of labor resources in rural areas, and the regional peculiarities of the formation and utilization of the labor force in agriculture.

In keeping with the program, the enterprises of the oblast will assimilate the manufacture of new designs of digging and planting machines for sugar beets, the output of sugar beet harvesting combines will increase by twelve percent and the output of sugar beet top harvesting machines will increase by 40 percent; in 1985 the production of sugar from beets will be increased to 412,000 tons, a 2.2-fold increase over 1980; and the quantity of canned fruits and vegetables will increase by eighteen percent during the five years.

The kolkhozes and sovkhozes of the oblast will use industrial methods for raising agricultural crops, primarily sugar beets. It is intended to introduce flow line and flow line-transshipment harvesting of sugar beets, and flow line harvesting of potatoes. It is intended to mechanize 143 animal husbandry farms and to introduce progressive technology in feed production. The implementation of the measures for raising the technical level of production in agriculture will provide for increasing labor productivity by fourteen percent during the five-year plan, changing 17.500 workers over from manual to mechanized labor, and saving the labor of 27,000 workers.

The program includes the development of 26 technical problems, including: obtaining new substances on the basis of the utilization of production wastes, technologies for manufacturing shaped billets by the method of electric slag smelting; the introduction of effective methods of long-term storage of sugar beets without significant changes in the qualitative indicators of the raw material in order to reduce the losses of sugar to a minimum; and efficient utilization of the machine and tractor fleet of the kolkhozes and sovkhozes.

Expenditures on automation and mechanization of production processes under the current five-year plan are increasing 2.3-fold. Enterprises of the oblast will put into operation 101 flow lines, 170 mechanized sections, 70 automated sections and 20 mechanized shops. This will make it possible to raise the level of mechanization from 54.9 percent to 59 percent during the five years. The number of workers employed in manual labor will decrease by 2500.

The comprehensive special-purpose program for scientific and technical progress envisions measures directed toward improving product quality. The funds allotted for the implementation of measures for improving product quality and assimilating the production of new items exceed the volumes allotted during the past five-year plan 1.8-fold. It is intended to assimilate the output of 89 new kinds of products, to modernize 330, and to remove 355 outdated ones from production. In 1985, more than 1000 kinds of products worth a total of 1.8 billion rubles will be awarded the State Emblem of Quality.

The subprogram for reducing the application of manual labor envisions reducing the absolute number of workers employed in manual labor by 21,800; 32,500 workers will be employed in mechanized labor instead of manual labor, and manual labor will be made easier for 60,900 workers. As a result of the implementation of these measures, labor productivity in the oblast economy will increase by 10.5 percent and 34,200 people will be conventionally released.

In construction, the introduction of industrial methods, the higher level of prefabricated elements, the expansion of mechanization and the implementation of other measures for raising the technical level of production will provide for increasing labor productivity by 5.6 percent during the five years and changing 1100 people over from manual to mechanized labor, and 1200 people will also be released.

In the oblast, as in the Ukranian SSR as a whole, there are no free labor resources. Because of this, in the program "Labor," the main factor in increasing production and labor productivity in all branches of the economy is the introduction of new technical equipment and advanced technology, the renovation and technical re-equipment of enterprises. These will provide for almost 85 percent of the increase in labor productivity in industry and construction in the oblast during the current five-year period and more than 90 percent of the overall increase in labor productivity in agriculture, including seventeen percent as the result of the introduction of measures for scientific organization of labor.

A constituent part of the program "Labor" is made up of measures which have been developed by the enterprises, organizations, kolkhozes and sovkhozes for improving the conditions for labor, life and recreation, raising the level of general educational and vocational knowledge of all the workers. During the years of the Eleventh Five-Year Plan, the number

of student accommodations in vocational and technical schools will increase by 27 percent, and the number of specialities in which skilled workers are trained will increase from 67 to 75. Moreover, by the end of the five-year plan, all vocational and technical schools will graduate specialists with a specialized secondary education.

A most important branch in the specialization of the economy of Ternopol Oblast is agriculture. In order to determine the ways of increasing the efficiency of production and increasing the volumes of production of agricultural products, the Food Program of Ternopol Oblast up to the year 1990 was developed. It presents the structure of the land supply in the oblast and its changes in the future (on the basis of a comprehensive analysis of natural factors), and earmarked ways and means of increasing the areas of agricultural land. It also stipulates other measures for developing agricultural production both in the oblast as a whole and in each individual rayon.

When developing the Food Program, they also took into account: the number and age composition of the rural population, its distribution throughout the territory of the oblast at the present and in the future; the transportability and conditions for preserving various kinds of agricultural products; the development of the road network in the oblast and the intraoblast and interoblast transportation ties when shipping products and means of production in the branch; the number of head of livestock and poultry and improvement of its varietal and breeding structure; and improvement of ogranizational forms of agricultural enterprises and methods of controlling them.

The main goal of the Food Program is to mobilize the internal reserves in order to increase the production of all kinds of food products as the result of increasing the fertility of the land and the productivity of animal husbandry, reducing losses and equalizing social conditions for the rural and urban population.

The Food Program has envisioned under the Eleventh Five-Year Plan increasing the average annual production of grain in the oblast to 1.4 million tons, which is sixteen percent more than under the Tenth Five-Year Plan. In order to provide for these gross yields of grain, the program has earmarked implementing a complex of agrotechnical measures, including considerably expanding the application of organic and mineral fertilizers and herbicides, improving the system of crop rotations, and improving the quality of grain crops as the result of the introduction of new regionalized strains. Measures have also been envisioned for providing for the preservation of grain during harvesting, transportation and storage. Their implementation will make it possible to increase the productivity of grain crops to 31.9 quintals per hectare.

In feed production, we will introduce industrial technologies for cultivating feed crops and better methods of harvesting them, preserving them and preparing them for distribution to the animals. It is intended to increase the yield of grass feed crops to 45 quintals per hectare. Before the end of the program, the areas planted in perennial grasses will be expanded, as will the areas planted in them on irrigted land. Surface improvement of hay fields and pastures will be carried out on an area of 52.000 hectares, and they will be radically improved on an area of 7000 hectares.

In order to provide for the planned volumes of production of products in animal husbandry, it is intended to introduce technology for producing beef that provides for obtaining daily weight gains of 800-1000 grams; an intervarietal crossing of hogs in order to obtain lines with higher indicators--the bearing of young and average daily weight gains. It is intended to implement a program of new construction and reconstruction of existing animal husbandry facilities.

In keeping with the Food Program, reliable ways and means will be introduced to reduce losses of agricultural products. Before the end of 1985, the capacities of storehouses for potatoes, vegetables and fruits with progressive methods of storing will increase to 83,600 tons.

In 1990, as compared to the average annual volumes during the Tenth Five-Year Plan, the program envisions increasing the volume of state procurements of grain by 19.8 percent, meat--by 31.4 percent, milk--by 21.6 percent and eggs--by 5.4 percent. As early as the end of the Eleventh Five-Year Plan, the productivity of grain in the oblast should amount to 32 quintals per hectare, and sugar beets-360 quintals per hectare. The stability of the harvests will be achieved as the result of improvement of the structure of the planted areas, the introduction of new strains and hybrids and progressive technologies, more effective utilization of fertilizers, and reduced losses of agricultural products.

Special attention is being devoted to the formation of an efficient social infrastructure in each village. There are 948 promising settlements in the oblast. Each rural soviet of people's deputies has drawn up long-range comprehensive plans for economic and social development.

Under the Eleventh and Twelth Five-Year Plans in all population points it is intended to construct paved roads, to fully satisfy the needs of the population for children's institutions, to provide specialists with good housing, and to considerably improve the medical service.

In keeping with the comprehensive special-purpose program, "Services," rural residents should have an urban level of services. In particular, the program envisions as early as the Eleventh Five-Year Plan, the creation of a stationary consumer service network in all population points,

increased efficiency of their operation, the organization of patronage assistance from leading city service enterprises for service enterprises in rural areas, the introduction of progressive forms and methods of service, and expansion of the assortment to a minimum of 400-500 kinds of consumer services. All this will make it possible during the decade to double the volume of sales of services in rural areas.

The results of the past two years of the current five-year plan convincingly confirm that the implementation of the assignments of the comprehensive programs is proceeding successfully. During this time the increase in the volume of industrial production in the oblast has amounted to 19.4 percent, and 9.2 percent more fixed capital has been introduced.

The assignments of the Food Program are being fulfilled. During the five months of this year, the number of head of all kinds of livestock has increased, the gross milk yield has increased by 27.7 percent as compared to the corresponding period of last year, the average milk yield per cow has increased by 215 kilograms, and more meat and eggs are being produced. The average weight of cattle that are released for sale has increased by 4 kilograms, and of hogs--by 15 kilograms. The average daily weight gain of cattle on fattening has increased by 155 grams, and hogs--by 80 grams. The successful implementation of the plans for producing animal husbandry products has appreciably affected the supply of milk and meat products to the population; the assortment of fruits and vegetables has expanded and the demand for them is being satisfied.

At the present time, the oblast and rayon agro-industrial associations are devoting significant attention to increasing fertility of the land, improving the quality of feeds, and reducing losses of agricultural products.

The experience in socio-economic planning in Ternopol Oblast and the analysis of this work show that in the near future it is necessary to solve the following problems:

to prepare methodological recommendations for drawing up comprehensive special-purpose programs at the oblast level;

to develop a unified system of operational control over the implementation of comprehensive special-purpose programs and comprehensive plans, and to determine clearly the material responsibility of the managers and specialists when the program and planned assignments are not fulfilled completely;

to create mathematical software for special-purpose programs;

to improve the training of engineering and economic personnel for work in regional planning agencies.

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WAYS OF ACCELERATING CREATION AND INTRODUCTION OF NEW TECHNICAL EQUIPMENT

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 9, Sep 83 pp 68-76

[Article by L. Meyerovich, candidate of economic sciences: "New Technical Equipment: Ways of Accelerating Its Creation and Introduction"]

[Text] At the November (1982) Plenum of the CPSU Central Committee, it was noted that one of the reasons for the unsatisfactory rates of introduction of new technical equipment is the difference between the degree of responsibility for the fulfillment of the plan for production volumes and the plan for new technical equipment. "...For failure to fulfill the production plan, people are held responsible, but for poor introduction of new technical equipment--well, the worst thing that can happen is that they are scolded," said Yu. V. Andropov.*

Since there are two plans which are economically independent in practice--for production and for the introduction of new technical equipment, and the degrees of moral and material responsibility for the fulfillment differ, the labor collectives direct their main attention and material, financial and labor resources primarily toward fulfillment of the production plan. This situation is also exacerbated by the fact that in order to assimilate new technical equipment, it is sometimes necessary to have large resources and expenditures of common efforts. The managers of all levels of administration of material production accept the plan for the introduction of new technical equipment as an unpleasant necessity and frequently spend more effort on finding so-called "objective" reasons for failure to fulfill the plan than on providing for its fulfillment.

The process of assimilating new technical equipment is always complicated and accompanied by large changes in the established production rhythm. As a rule, new technical equipment cannot be manufactured according to existing technology, and changes in the forms of organization of labor

*"Materialy Plenuma Tsentral'nogo Komiteta KPSS 22 Noyabrya 1982 goda" [Materials of the Plenum of the CPSU Central Committee of 22 November 1982], Moscow, Politizdat, 1982, p 10.

and production are needed. Naturally, considerable labor and material expenditures involved in preparing production are reflected in the smooth rhythm of the output of traditional products.

New technical equipment (machine tools, technological lines, sets of equipment and so forth) is most frequently a modernized variant of products that are produced in series by the machine building enterprises. Only an insignificant part of it is created on the basis of discoveries that change the principle of operation or involve a radical change in the production of the consumer. When technical equipment is modernized, as a rule, the class of precision and purity of processing of the parts is raised, which, in turn, involves the introduction of additional technological processes (for thermal processing, polishing, honing and other finishing operations) and also the application of materials that have higher specifications. In order to satisfy the increased requirements for the manufacture of parts, the assembly and the final product as a whole, it is necessary to increase the coefficient of technical support for production and the application of special new instruments and fittings.

An example of the difficulties experienced by machine builders when changing over to the production of new technical equipment can be the assimilation of the STB-2-175 microloom for producing linen fabrics with a shift output of 80 square meters (instead of the AT-100-L5 looms with a productivity of 41.6 square meters). The advantage at spinning factories was obvious: productivity increased 1.92-fold, there was a sharp reduction (down to the established normatives) of noise and pollution of the air with dust and scraps of thread, and the working conditions for the spinners improved.

But production became more complicated for the machine builders. The proportional labor-intensiveness of the technical equipment (labor expenditures per unit of its productivity) increased from 4.182 norm-hours per one square meter of fabric when it was manufactured on machine tools of the AT type to 17.16 when producing looms of the STB type, that is, 4.1-fold, and the wholesale price increased only 3.85-fold. It should be added that the production of looms of the STB type place greater requirements on the organization of production process and its provision with modern equipment, special instruments and fittings, skilled workers, engineering and technical personnel and production organizers. The wholesale price established for the STB-2-175 looms does not compensate for expenditures related to satisfying the aforementioned requirements, which reduces the economic motivation of the enterprises to produce the new technical equipment. The technical and economic indicators of the labor collectives that produce AT and STB looms are not comparable either.

As a result of what has been described above, an enterprise that assimilates the output of new technical equipment is forced to increase proportional expenditures of labor and materials per one ruble of wholesale

price, since the increased labor-intensiveness and also the increased cost of materials and batching items sometimes are greater than the increase in the basic technical parameters of the new items (capacity, number of rotations, productivity) as compared to the analog, and the wholesale price in these cases can be, as a rule, increased only within the limits of the increase of the latter. If one adds that with the introduction of new products there is not only an increase in the technical parameters of the items, but there is also a change in the so-called social factors--noise and pollution (with dust, gas fumes and so forth) are reduced, the interiors are decorated more efficiently, control becomes more convenient--this again confirms that the wholesale price for new products does not always make up for additional expenditures which are made by the labor collective when organizing the output of the product. In the latter methodology, the determination of the wholesale prices and the normatives of new output for new machines, equipment and instruments for production and technical purposes, which was approved by the USSR State Price Committee in 1982, unfortunately, does not contain normatives and methods for calculating the influence of these social factors. The difficulties of the enterprise depend also on the scale of the assimilation of the progressive new products and their proportion in the overall volume of production, as well as on the degree of standardization of components and parts of the new items.

As one can see from what has been said, the creation and assimilation of new technical equipment is a multifaceted process which is complicated and all-encompassing. Many attempts have been made to find forms and sources for reimbursing losses which labor collectives sustained during this. It was necessary to reimburse them in the production volumes, profit from the sale of products, rates of growth of labor productivity, the wage fund and the other technical and economic indicators.

At the beginning of the 1960's, by a special decision, the Fund for New Technical Equipment was created, which was intended for reimbursing additional expenditures which were defined as the difference between the planned production cost of new technical equipment and the normative production cost in the wholesale price for this item. In order to reimburse losses in production volumes it was also envisioned that the sum of expenditures related to the organization of production of new items and made from the Fund for New Technical Equipment be included in the commercial (gross) product. Thus it was suggested that when receiving compensation from this fund (both in production volumes and in expenditures), the labor collectives would not sustain losses during the assimilation of the output of new technical equipment. As a source for the formation of the Fund for New Technical Equipment, they used the production cost of the industrial product, from which they established stable normatives for deductions, in particular, three percent for machine building ministries. Moreover, they continued to make deductions from the cost of scientific research work (NIR).

The basic sum of the Fund for New Technical Equipment was intended for financing scientific research and planning and design work for creating new technical equipment and designing technological processes for its manufacture if the existing technology did not provide for this. The fund was utilized according to the following system. Enterprises that had to assimilate new products were given a limit on the Fund for New Technical Equipment and played the role of the client for scientific research and experimental design work. But accepting developments from scientific research institutes and design bureaus, the enterprises paid them for the cost of their work from the Fund for New Technical Equipment. Work for manufacturing experimental models was also financed from this fund. With successful testing of the experimental model, the earnings from its sale went to augment the Fund for New Technical Equipment.

Research work conducted by scientific research institutes, if it could not be included in concrete developments, was funded by special deductions from the State Budget in excess of the Fund for New Technical Equipment which the ministry had at its disposal, as well as the aforementioned deductions for NIR from the production cost.

If one analyzes this problem from the standpoint of its economic essence and coordinates it with the entire chain along which new technical equipment moves, then with the creation of the Fund for New Technical Equipment the question of the formation of an economic system that stimulates its appearance remains, as we see it, practically unresolved. The selection of the production costs of the commercial output as a source for forming the Fund for New Technical Equipment was not economically justified. It turned out that the cost of all machine building products artifically increased more rapidly than the wholesale prices did.

Since new technical equipment is not assimilated by all enterprises and it is not done uniformly among the branches, a mechanism was developed for centralization and redistribution of these funds. In the system of the Ministry of Machine Building for Light and the Food Industry, the basic amount was deposited in the Fund for New Technical Equipment by the main boards (VPO) of Soyuzelektrobytmash, since it has the greatest production volume in the branch, and the most was received by the main boards (VPO) of Soyuzpoligrafmash. The other main boards (VPO) used money from the Fund for New Technical Equipment with various deviations both in the direction of increasing and of decreasing the sum of deductions into this fund. This phemonema was brought about by differences in the degree of complexity of the products produced, their series production and expenditures on preparing for production. But the directive deductions into the Fund for New Technical Equipment from the production costs were made according to stable normatives. This meant that payments were actually made from this fund to those who had nothing to do with the given new technical equipment; there was a violation of the principle of average branch necessary expenditures which are taken into account when determining wholesale prices.

The Unified Fund for the Development of Science and Technology (YeFRNT) to replace the Fund for New Technical Equipment led to an essential change in the sources for covering expenditures on its creation and introduction. Instead of the production costs--the main source for the formation of the Fund for New Technical Equipment--deductions are made into the YeFRNT from profit. Then the normative for forming the new fund was established in terms of volume indicators of the operation of the enterprise or association--the commercial output (or NChP). Other sources for deductions into the YeFRNT are increments to wholesale prices for the efficiency of items of the highest quality category, and also savings from reducing production costs that are achieved through applying progressive technology. Moreover, deductions for NIR from the production cost and also from the state budget were abolished.

The changeover to financing the entire complex of work for creating and assimilating new technical equipment from the YeFRNT eliminated the aforementioned shortcomings of the Fund for New Technical Equipment, but then new economic complexities arose. The introduction of the YeFRNT meant in practice, in our opinion, a changeover to financing expenditures for the creation of new technical equipment from the state budget, since payments into the budget from profit obtained by the enterprise were reduced by the sum of its formation. Here, however, one must note that deductions into the YeFRNT are made after the fulfillment of committments to the budget and a number of other payments, and this means that when the plan for profit is not fulfilled, deductions into the fund are not reduced correspondingly.

The areas for the utilization of money from the YeFRNT have practically not changed from those for which the Fund for New Technical Equipment was expended. A system of contractual-legal relations when utilizing YeFRNT funds has been developed and is in effect. The head enterprises, as before, are given limits from the fund, conclude agreements with scientific research institutes and design bureaus for the development of normative technical documentation for the new item, finance the manufacture of the experimetal model, and participate in the production testing and release of the experimental model by the interdepartmental commission. There is a system of economic incentives for the development and assimilation of the output of new technical equipment, and measures are taken for the introduction of a unified system of control throughout the entire cycle (research--manufacture of the experimental model--development of normative and technical documentation--assimilation of series production of the new product).

But the introduction of the YeFRNT introduced practically nothing new into the economic coordination of production and activity of the enterprises that are assimilating the new technical equipment and did not link technical and economic indicators to the system of moral incentives for participants in the process of creating new technical equipment. The collectives of the enterprises and organizations do not have the proper economic motivation to accelerate assimilation and output. All this,

in our opinion, is taking place because there is no economic interdependence among the researcher, designer, technologist and manager of the industry that is assimilating the production and those who are applying the progressive technology.

Let us break down into stages the process of the creation and assimilation of new technical equipment from the standpoint of incentives for its participants. The scientific worker conducts research of the main theoretical and calculation data which provide a theoretical base for the new design decisions. If his work cannot be evaluated from the standpoint of the national economic effect from the operation of the future item or technological process, he receives a bonus in addition to his salary. This bonus is set in the amount of 20 percent of the sum of the earings of the developers which are envisioned by the estimate for the given subject. The further destiny of the developments practically do not interest the scientific worker. The only motive force that remains for the progress of the developments is the author's prestige. It is precisely the lack of material and moral incentives, in our opinion, that is the main reason for the considerable number of unrealized scientific research developments of branch institutes and the poor labor productivity of many scientific workers.

The next stage is the experimental design development of the plan. The design collective, including each leading specialist, when developing the design for a new item, in addition to wages, can receive material incentives from the economic incentive fund if the design is progressive and provides for certification of the item in the highest quality category. In this case, an incentive increment is added to the wholesale price, part of which goes for bonuses for the developers. The amount of the bonus can also be increased as the result of additional incentive increments to the wholesale prices for the utilization of patents and discoveries when developing the design. But it is necessary to pass through the following stages from the time of the creation of the design until the receipt of the bonus: the production of an experimental model, its testing and acceptance by an interdepartmental commission, the establishment of the wholesale price with an increment to it and, finally, series production of the item for which one can obtain an increment from the consumers. Since all this takes years, the incentive value of the bonus decreases sharply.

What has been said can be confirmed by the creation of a loom which operates according to a completely new principle--continuous fabric formation (the so-called "multiple jar loom"). The idea of this method of forming fabric was theoretically substantiated and tested with a dummy by specialists of the VNIILTEKMASh as early as the 1970's. Experimental design developments have been underway for several years. The first experimental series was produced in 1982. In 1983, it is intended to begin assimilation of series output and to establish the wholesale price and the incentive increment. There is nothing surprising in the fact that the scientific workers who participated in the development of the concept and its

theoretical and experimental substantiation have to wait too long for real material incentives for practical implementation of their ideas. For a no less important stage is still forthcoming--the assimilation of the looms at spinning factories, which involves teaching people and developing and introducing a system of organization of labor and production which corresponds to the requirement of the new technological equipment. Not only the scientific workers, but also the designers who participated in the initial stages of the creation of the new loom have to wait such a long time from the beginning of the work until they actually obtain the sums of material incentives in the form of incentive increments to the wholesale price that the prospects for obtaining this bonus lose their actuality.

This kind of incentive also has a weak influence on workers of enterprises that assimilate the output of new technical equipment. Thus, according to our calculations, if at an enterprise the proportion of new items (the first or second year of production) in the volume of products that are produced amounts to no less than 25 percent, it loses no less than 12.5 percent of the volume of gross output. Moreover, the assimilation of the output of new products leads to a decline in the rates of increase in labor productivity, profit and the other fund-forming and evaluating indicators of the work of the collective.

The introduction of new technical equipment and the organization of its correct operation are an indispensible part of technical progress, and an attempt to limit the system of incentives to the stages of creation and manufacture of new technical equipment alone, excluding the stages of organization of production testing and particularly operation, as practice has shown, is wrong and leads to negative results. It is precisely the role of the consumers that sometimes ends up to be the major role in deciding the destinies of new developments. The consumer carries out production testing of experimental models and of the first series of new technical equipment, and organizes and provides for operation of new machines and sets of equipment. The effectiveness of the application of new technical equipment depends on the ability and skills of the people. There are many cases in which extremely progressive technical equipment, because of its poor introduction, has undeservedly been given a negative evaluation or has been evaluated as not very effective, as the result of which it has been removed from production or the volumes of production have been reduced. This is why, in our opinion, it is inadmissible to leave outside the system of material incentives the consumers of new technical equipment whose collectives must, in the final analysis, achieve the economic effect from its introduction.

In the conclusion of the analysis of the present situation with respect to the implementation of the achievements of technical progress, one should note that the existing system of planning the volumes of production and the other technical and economic indicators, price setting and material and moral incentives, do not provide for unified economic coordination of all stages of the creation, assimilation of the output and operation of new technical equipment.

A radical change in the process of its creation and assimilation, a sharp reduction of time periods and increased national economic effectiveness of new developments can be achieved, in our opinion, by changing over to a system of self-financing through incentive increments to the wholesale proces for the effectiveness of products and deductions from the sums that are actually saved as the result of the introduction of new technology. In other words, it is necessary for the developers of the new technical equipment to be changed over to autonomous financing in essence, and not formally as is now the case. Moreover, it is necessary to create a system of material incentives which includes all stages of the cycle "science--technical equipment--production--consumer," beginning with the assignments for planning, the production of scientific research work, design developments and series output, and ending with the assimilation of the manufactured new technical equipment under the production conditions of the consumer.

In order to achieve the aforementioned principles, it is necessary to make the following changes in the system of planning, financing and material incentives for the process of the introduction of new technical equipment. Financing the maintenance of branch scientific research institutes, design bureaus and planning and design technological institutes (including the payment of wages and bonuses, the maintenance of the administrative staff of these organizations and amortization of fixed capital) is carried out, as was pointed out above, through deductions from the incentive increments to the wholesale prices and the actual savings achieved from the introduction of new technology. The ministry establishes for each organization a time period for the changeover to the new system of financing. It seems, as a rule, that this can be limited to five years. During this time, as they accumulate circulating capital that is released from the YeFRNT, the sum should be returned to the State Budget. The time periods for deductions from incentive increments, and hence the time periods during which the increments themselves are in effect should also be lengthened to five years. When a sufficient amount of circulating capital is accumulated, the maintenance of the scientific research institutes, special design bureaus and planning and design technological institutes is carried out only through deductions from the actual increments to prices and savings from the introduction of new technology. There is no doubt that for each institute or design bureau, the time period for achieving the possibility of changing over to financing through their own funds will differ, depending on the concrete conditions. The possibilities of reducing this time period to three years or, conversely, extending it beyond five years are not ruled out. This changeover to self-financing relieves the State Budget from maintaining scientific research institutes, design bureaus and planning and design technological institutes.

In order to carry out this changeover, in the system of financing it is necessary to expand the rights of the managers of the aforementioned

organizations when selecting personnel, placing them and paying them. Here it is hardly expedient to have limits and limitations on the numbers of senior and junior specialists, managers and workers. These limitations inevitably lead to a situation where the management of the institute, in order to have the opportunity to satisfactorily pay the creative worker, is faced with the need to select unnecessary staff units without much initiative which are practically useless to the creative collective just in order to maintain the established ratio between senior and junior specialists, managers and rank-and-file workers.

The principle of autonomous financing should be extended within the scientific research institute to divisions and sectors. If a division (sector or other structural unit engaged in the development of a specific subject) has achieved an economic effect, it has the right to the corresponding payment for the work of the workers. And if they have not achieved an economic effect for two or a maximum of three years, these subdivisions should be broken down and their managers should be deprived of the right to hold similar positions for longer than the established time period. The payment for the labor of these subdivisions within a specific time (a year or two before the situation is rectified and an economic effect is achieved) should be made according to the minimum salaries through centralized funds of the institute. In other words, it is time to change over to paying for the labor and organization of work of creative collectives according to the principle of comprehensive brigades. The collective itself will decide which of the workers is working efficiently or inefficiently, regardless of his scholarly degrees and titles. In order to provide for effective introduction of this system of organization of the work of creative collectives, it is also necessary to change the system of material incentives, planning and organization of the work for introduction of the developments of scientific research institutes, design bureaus and planning and design technological institutes. It should embrace enterprises that manufacture the new technical equipment and assimilate it.

Of essential importance for this problem are the methods for planning the volumes of production for enterprises that assimilate the output of new technical equipment. The fact is that the existing methods of accounting for the utilization of production capacities and, consequently, the determination of the production volumes do not make it possible to take into account the influence of the assimilation of new technical equipment, its proportion in the overall volume of output, the sequence (that is, the proportion of standardized components and parts in the makeup of the new items and their technological sophistication) and a whole number of other factors that facilitate or, conversely, complicate the production process.

In order to provide for unity in the planning and evaluation of the fulfillment of the plan for the main technical and economic indicators for

the work of the branch, associations and enterprises that have a plan for new technical equipment, it is necessary to develop methods of planning and evaluating the fulfillment of the plans in terms of production volumes, labor productivity, production costs and profit, coordinating them with the availability of production capacities, proportions of new technical equipment in the overall production volume (first and second year of assimilation), series production, and also the degree of standardization of the equipment that is produced. These methods must envision accounting for production capacities on a normative basis. These normatives should include normatives of the receipt of products per unit of modern metal processing equipment; proportions of new technical equipment in the overall volume of production; optimal sizes of production capacities of sections that provide for the modern technical level of machine building products (thermal, galvanizing, experimental, and also capacities for producing special fittings and instruments); and the proportion of unified components and parts. Thus, if the proportion of new technical equipment in the overall volume of production is ten percent, the production capacities for determining the planned volume of production are multipled by the normative coefficient which is equal to 0.98; if this proportion is fifteen percent, then it is 0.97; if it is twenty percent, 0.95, and so forth. When evaluating the fulfillment of the plan it is necessary to apply reduction coefficients that take into account failure to provide the planned volumes of output of new technical equipment in terms of other normatives.

A special position should be allotted to the output of new items of the highest quality category with a high national economic effectiveness, which also contribute to increasing labor productivity. Calculations show that if the Ministry of Machine Building for Light and the Food Industry were to provide for fulfillment of the volumes of new products planned for the Eleventh Five-Year Plan, which amounts to more than 1200 kinds of technological equipments, automated machine tools and sets of equipment, and the enterprises which are consumers of this equipment were to fully assimilate their technical and economic parameters, it would be possible to release conventionally 1.3 million industrial production personnel, including 860,000 in the food branches of industry and at trade and public catering enterprises. Hence, the economic expediency in planning, stabilizing or even reducing the production volumes for machine building enterprises while retaining or increasing the number of industrial production personnel if highly effective new technical equipment is produced, since this will be more than recouped when it is used.

In order to use the plan to stimulate the process of assimilation of new technical equipment, it is also necessary to assign the production volumes to those enterprises which are assimilating the new technical equipment according to normative coefficients which take into account the proportion of assimilated equipment in the overall volume of production capacities. For example, a weaving factory that is equipped with ATPR-2M

looms with a productivity of 16,000 meters per hour updates its equipment so that ten percent of the looms have a productivity of 30,000 meters an hour. In order to motivate the collective to accelerate the assimilation of the new looms, the plan for the first year should be increased not by 5.8 percent, but only by 2 percent, so that with successful assimilation of the new looms, it will be possible to overfullfill the production plan.

An important role in the assimilation of the output of new products is played by the method of calculating planned resources. This is why the plan for material and technical supply must be divided into two parts: according to the comparable products and according to new technical equipment. And the part for new technical equipment should determine the resources through direct accounting for each item.

No small role in the organization of autonomously financed activity of the enterprises, and also assimilation of new technical equipment, is played by the calculated level of profitability of wholesale prices and normatives of net output, depending on whether the new product is included in one price list or another, that is, a particular group of items. In the Ministry of Machine Building for Light and the Food Industry, for example, products produced in keeping with the technological purpose are distributed among 29 price lists (the price list for technological equipment for the printing industry, technological equipment for the textile industry, and so forth). The level of normative profitability for each price list differs and ranges from ten to sixteen percent. And if one uses the profitability in terms of the production costs not including material expenditures, its level ranges from 200 to 400 percent. Within the price list, there is differentiation of the profitability according to groups and kinds of equipment, depending on their material-intensiveness. Naturally, when a plant assimilates a new product which belongs to a different price list or kind of equipment than the one which prevails there, there are inevitable sharp fluctuations in the proportional labor-intensiveness and in the remaining technical and economic indicators. Planners include these fluctuations in the so-called structural changes.

In order to eliminate the influence of structural changes, the price lists for products of the Ministry of Machine Building for Light and the Food Industry have been constructed according to a unified normative. The work experience of the associations and enterprises in 1982, under the condition of the application of new wholesale prices and the normative net output, fully confirmed the correctness of the decision adopted by the USSR State Committee for Prices and the Ministry of Machine Building for Light and the Food Industry concerning the unity of profitability within the branch. In order to provide for economic preference for the assimilation of new technical equipment, it is necessary to improve the system of material incentives for its creation.

It seems necessary to change the system for determining the amount of the bonuses for the immediate participants in the process of assimilating the output of new technical equipment (within the limits of the sums of deductions from incentive increments to wholesale prices for items for their effectiveness). The amount of the incentive should be coordinated not only with the quantity and quality of the new items, but also with the time periods for the assimilation of their production. When reducing the normative time periods, the percentage of the bonus should be increased according to the actual savings achieved by the enterprise as a result of this. It is precisely the coordination in the plan for new technical equipment with the basic evaluating indicators of the work of the enterprise, and primarily the volumes of production and material incentives, that should remove the obstacles on the path to accelerated assimilation of the output of new products.

It is also necessary to solve the problem with the assimilation of new technical equipment at the enterprise of the consumer. Here, too, the collectives encounter difficulties. Each new machine tool or technological automated line requires a new form of service and knowledge of its design and the peculiarities of its operation, and this changes the forms of organization of production and labor. All this causes an additional load on the participants in the process of assimilation. Moreover, the new technical equipment leads to changes in the production capacities of the enterprises which have assimilated it, and it also changes the quality of the products that are produced. It is necessary to have material incentives for the collective as a whole as well as each worker to accelerate the assimilation of the new technical equipment. This is why it is necessary to make changes in the methods for determining the planned technical and economic indicators of the enterprises that assimilate principally new technical equipment and technology and, moreover, some of the incentive increments for the effectiveness should be allotted to the consumers of the new technical equipment for its successful assimilation.

The organizational structure of the control of this process is quite significant when developing and assimilating it. In the work practice of the Ministry of Machine Building for Light and the Food Industry, extremely positive results have been achieved in the organization of the scientific production association (NPO) of glass machine building. This NPO included the Scientific Research Institute of Glass Machine Building as the head organization, a special design bureau and all glass machine building plants of the country. During the time of its activity, the NPO has achieved a good deal of success both in providing for rhythmic and stable operation of the plants for series production of the products that have been assimilated and in accelerated development and assimilation of series production of complicated technological lines for producing glass items. A number of developments of this NPO have been awarded government awards for the successful assimilation of the output of complicated technological lines.

But the existing methods for financing and material stimulation have not made it possible to create a unified economic mechanism in the NPO. The institute and the special design bureau have been financed through the Fund for New Technical Equipment, and the activity of the enterprises has been regulated by principles of autonomous financing. The matter has reached the point of being absurd. Having awarded this NPO a class position in the socialist competition, the board of the Ministry of Machine Building for Light and the Food Industry and the trade-union central committee were placed in a difficult position, trying to find a source for the bonuses. For the enterprises this source has been the profit, and for the institute and the special design bureau--the bonus fund for new technical equipment.

There is no doubt that it is impossible to solve all of the aforementioned problems simply, without preliminary development of the corresponding methods, a determination of the percentages of deductions for participants in the process of the creation, assimilation, output and application of new technical equipment, and without a well-developed system of financing and material incentives. But we are convinced that only a comprehensive approach to solving this problem, both economic and organizational, is the basic and decisive factor in the accelerated process of assimilating new technical equipment and advanced technology.

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CONSUMER VALUE IMPORTANT IN EVALUATING TECHNICAL EQUIPMENT

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[Article by V. Perepechenko, candidate of economic sciences (Vologda): "Evaluation of the Effectiveness of New Technical Equipment on the Basis of Its Consumer Value"]

[Text] The 26th CPSU Congress pointed out that while accelerating the rates of updating new equipment, "One cannot allow enterprises to produce items that are outdated in their design, whose application does not produce an appreciable increase in labor productivity."[1] High productivity of technical equipment is originated by scientific labor in the initial stage in the creation of the innovation. But the products of scientific labor--knowledge, ideas, information and plans--are realized economically in production, when by means of special developments and designs the achievements of science are embodied in the new product, new technical equipment, technological processes, instruments and so forth.

Acceleration of scientific and technical progress as the main factor in the intensification of production requires improvement of the activity of all units of the economic mechanism through which the development of new technical equipment, its creation and introduction into production pass. And here, in turn, a good deal depends on the economic criteria that lie at the basis of the evaluation of its effectiveness. The need for the development of these criteria is especially important because of the fact that in the five-year plans of the ministries, associations and enterprises at the present time they establish indicators for the introduction of new technical equipment, including the main indicators of the technical level of production, and the most important kinds of products that are produced, the economic effect from conducting scientific and technical measures, and so forth.[2]

Since the criteria for the effectiveness of new technical equipment should be directed toward improving the final national economic results, when evaluating the effectiveness, in our opinion, it is necessary to take into account the participation of new technical equipment, in the first place in the improvement of the consumer qualities of the product and improving its quality and, in the second place, in the savings on labor and material resources.

At the present time value ratings of the effectiveness of technical equipment are the most theoretically developed and the most widely used in practice. Public recognition of the results of scientific and technical progress is usually related to an increased contribution to the creation of value and profit. Related to the movement of value are indicators which are used to measure the effectiveness of new technical equipment such as production costs, price, profit and so forth. The economic evaluation of new technical equipment is also carried out through determining the reduction of the costs of the products that are produced with it, and through a comparison of expenditures of embodied (past) labor and newly created value in the overall cost of the product which is produced with the machines. On the basis of value, the law of the application of machines in a socialist society[3] is formulated as follows:

$$c < (v'+m') \qquad (1)$$

where c--labor expenditures on the manufacture of machines; v'+m'--savings of live labor expressed through the newly created value.

Hence, the economic effectiveness of the machine appears thus

$$\frac{v'+m'}{c} \qquad (2)$$

The economic criterion for the application of technical equipment expressed in the formulas (figure 1) and (figure 2) presupposes a savings of public labor which is measured by means of value categories. But, in our opinion, this approach is one sided. The effectiveness of technical equipment under socialism should take into account primarily the contribution to the creation of the direct social product, and this is possible only by means of a description of its own consumer value. It is precisely the consumer value of machines, instruments and equipment that should be compared with labor expenditures on their creation when determining the effectiveness.

The solution to problems of intensifying production and increasing its effectiveness require increased attention to problems of product quality, its social usefulness, and its ability to satisfy the needs of the society. This "presupposes a serious consideration of the position and role of the consumer value and the physical indicators of production that are related to it in the economic system of developed socialism.[4] In this connection let us note that the consumer value of technical equipment is practically not taken into account when evaluating its effectiveness, nor are the results of the initial stages of the process "research--production."

Yet, the economic evaluation of the means of production (technical equipment, machines, mechanisms and instruments) by means of their consumer value is sufficiently substantiated. In particular, V. Medvedev writes: "The

quantity of labor expended on them (means of production--V.D.) which lies at the basis of the value, in a socialist society has an essential, but not self-contained significance. It shows how much labor was expended on their creation in the preceeding periods, but it does not give an idea of the role of the means of production in the production process that is taking place at the present time or of their contribution to the production of the actual social product and, thus, to the satisfaction of the needs of the society. Of decisive significance in a socialist economy is the consumer value both of the social product itself and of the means of producing it."[5]

The development of criteria for economic evaluation of technical equipment from the standpoint of its consumer value presupposes taking into account a number of aspects. Conducting scientific research and development in industrial production contributes to the creation of higher-quality products. The product "assumes a more final form and a higher consumer value..."[6], as a result of which it can more fully satisfy one need or another. This is manifested primarily in the fact that "with the help of machines human labor manufactures and creates things which it absolutely could not create without machines."[7] Thus the essential and most widespread characteristic of consumer value of technical equipment is its ability to participate in the creation of a useful product. But this characteristic is not exhaustive. The implementation of the achievements of science and technology leads to the creation of a higher consumer value of the technical equipment itself. "The consumer value of a machine," wrote K. Marx, "and its replacement of human labor is also a consumer value, does not determine its value; the latter is determined by the labor necessary for its own production."[8] In this statement by K. Marx, one should draw special attention to the fact that the consumer value of a machine does not amount simply to its ability to perform useful work, in other words, to its consumer qualities and technical characteristics. It is understood in a broader sense--as the replacement of human labor. Here the savings of human labor obtained with the help of the machine is not directly related to the quantity of labor spent on the manufacture of the machine itself and, consequently, to its value. The savings on labor with the application of the technical equipment is also the actual economic effect from its utilization. This effect, and not only the savings on the value of the technical equipment, should lie at the basis of the evaluation of its effectiveness.

Analyzing the role of machines in the production process, K. Marx pointed out that "the difference between the labor which the machine costs and the labor which it saves, or the degree of its productivity, obviously, does not depend on the difference between its own value and the value of the implement which it replaces."[9] At the same time he noted that "there exists a large difference between the machine as an element in the formation of value and the machine as an element in the formation of the product."[10]

This point is not taken into account in the well-known formula for calculated expenditures in which one determines the difference between expenditures on

the new and the base technical equipment, and the technical equipment itself is registered only as an element in the formation of the value. According to this formula, the best variant of new technical equipment is selected on the basis of the criterion of the minimum calculated expenditures:

$$E=Z_b-Z_n \tag{3}$$

where E--the difference between calculated expenditures; Z_b, Z_n--calculated expenditures on the production of the annual volume of the product or the work when utilizing the base or the new variable of technical equipment, in rubles.

$$Z=(C + Y_nK) \cdot A$$

where C--cost of manufacturing the product; Y_n--normative coefficient of effectiveness; K--capital investments; A--volume of production of product.

From this formula one can see that the decisive thing in determining the effectiveness of technical equipment is the difference in the value of expenditures on it, and this, as was shown above, does not reflect the actual economic effectiveness of the means of labor--their ability to replace (save) human labor when they are used. The evaluation of technical equipment from the standpoint of its participation in the process of forming value alone and the lack of influence of this criterion of effectiveness on the participation of technical equipment in the process of forming the product and its technical and economic characteristics weaken the amount of attention paid to the most important role of technical equipment in satisfying the production needs of the society. An underestimation of the consumer qualities of new technical equipment leads to a situation, as was noted at the 26th CPSU Congress, where "in a number of cases newly introduced equipment is not very different in its technical and economic parameters from the already existing equipment, and its value is higher."[11]

In order to evaluate the effectiveness of new technical equipment it is important to determine how much manual labor it replaces and to establish the difference between the replaced labor and the labor expended on the creation of the technical equipment. It is also necessary to know which part of the live labor which is replaced by technical equipment is being considered: all the labor or only the necessary labor. This requirement is also essential when determining the amount of labor expended on the creation of technical equipment. Accounting for complete labor expenditures (both necessary and added) for the creation of technical equipment is oriented toward economizing on all the labor of the workers who create the technical equipment, and not only on the wages. This approach is of great socio-economic significance since it is oriented toward economical expenditures of all labor that is applied in production. Additionally, this approach broadens the economic boundaries of the application of technical equipment.

The complexity of taking this approach to determining the economic effectiveness of new technical equipment through its consumer value consists, in the first place, in the poor development of the problem of measuring labor productivity with the help of the system of labor indicators (on the basis of accounting for the savings on complete expenditures of live labor) and, in the second place, in the lack of accounting for the general (total) labor-intensiveness of the manufacture of the means of production (technical equipment).

Under capitalism, as K. Marx pointed out, not every savings on labor is advantageous to production which is based on a mechanism for obtaining added value. Capitalists are interested in saving on the paid part of live labor. On the contrary, the invention of a machine and its application turns out to be disadvantageous if it does not provide for saving on the paid part of labor, even if a savings on all of live labor is achieved this way.[12]

In his calculations regarding the economic evaluation of the utilization of the machine, K. Marx noted especially that the savings from its application is not equal to the savings on the wages of the workers that are replaced by it and should not be reduced to this, for the latter reflects only the greater or lesser (depending on the added value) part of the overall quantity of labor expenditures necessary for performing a given volume of work. When evaluating the work of a fallow tractor with a fallow plow, he notes that although this machine in one hour, depreciating by one-fourth of a shilling, accomplishes as much work as 66 workers paid fifteen shillings, would be incorrect to think that the fallow tractor produces a savings of these fifteen shillings. With respect to the labor that is added to the necessary labor, which is equal to 100 percent, these 66 workers have produced in one hour a value of 30 shillings. Consequently, expenditures on the tractor (one-fourth of a shilling) should be compared with a savings not of fifteen, but of 30 shillings. K. Marx draws the conclusion that even if the machine does not cost as much as the labor force it replaces, the labor embodied in the machine itself is much less than the live labor it replaces.[13]

In a socialist society one must pay attention to the savings on all live labor, both necessary and added. The utilization of only savings on calculated expenditures as a criterion for the economic effect achieved as a result of the application of technical equipment does not correspond to this condition since here one takes into account only part of the savings on live labor which is expressed in the wages. "The determination of the annual economic effect by comparing 'calculated expenditures' for old and new technical equipment," notes A. Kolyada, "gives far from the complete amount of the economic effect obtained as the result of the introduction of the best models of technical equipment, and is directed primarily toward the introduction of less expensive old models of technical equipment."[14] The

limited nature of the approach to evaluating expenditures is pointed out by A. Kats. "During the last decade and a half," he writes, "in scientific literature and also in planning practice there have been criteria of effectiveness which, in our opinion, are only formally directed toward optimizing the development of the national economy since they can actually retard the rates of scientific and technical progress and the growth of labor productivity in public production."[15]

The lack of development of economic criteria of the effectiveness of new technical equipment and the corresponding narrowing of the economic boundaries of the application of machines under socialism, in our opinion, is reflected negatively in the introduction of means of mechanization of labor. One of the reasons for the low level of mechanization of many production processes, especially auxiliary ones and those that serve production, is the lack of motivation of enterprises to replace "inexpensive" working hands with "expensive" mechanisms. The application of the existing methods for determining the economic effectiveness of means of mechanization of labor which is based on calculations of savings on wages makes it "disadvantageous" to introduce many kinds of new technical equipment and narrows the economic boundaries of their application. Means of mechanization frequently turn out to be costly for the enterprise, and the economic effect from their introduction, according to the accepted methods of calculation, are insignificant. And this is in spite of the fact that many means of mechanization of labor (for example, industrial robots) not only save on live labor, but also replace man when performing heavy, unattractive and sometimes dangerous work.

The utilization of consumer value--the savings on all public labor--as an economic criterion for the effectiveness of new technical equipment presupposes accounting for all actual expenditures on the production of technical equipment, and also the labor released by it (both necessary and added). Thus the overall criterion for the effectiveness of new technical equipment (Y) can be expressed as

$$Y=\frac{V_{rv}}{Z}$$

where V_{rv}--working time released by technical equipment; Z--expenditures on the creation of technical equipment.[16]

The calculations we gave (see table) show that with an increase in the overall expenditures there was also an increase in the additional profit and annual economic effect from the introduction of measures related to new technical equipment. At the same time there was a reduction of the number of released workers and the indicator that reflects the ratio between this and expenditures on introduction.

Economic Effectiveness of Measures for New Technical Equipment

	1970	1975	1975 in % of 1970	1980	1980 in % of 1975
Number of measures introduced for new technical equipment, thousands	423	621	146	773	124
Actual expenditures on introduction of measures (including expenditures of past years), millions of rubles	5011	7518	150	9682	129
Relative number of released workers, thousands	399	576	144	555	96
Additional profit from introduction of measures per year, millions of rubles	1971	2828	143	3216	114
Annual economic effect from introduction of new technical equipment, millions of rubles	2607	3832	146	4785	124
Ratio between released workers and expenditures on introduction of measures-- thousands of workers / millions of rubles	0.0796	0.0766	0.96	0.0573	0.75

*Compiled from: "The USSR National Economy in 1980," Moscow, 1981, p 100.

The existing methods of determining the economic effectiveness of new technical equipment, in our opinion, while contributing to the introduction of less expensive technical equipment, at the same time do not adequately take into account the changes in its technical and economic parameters and the reduction of the cost per unit of useful effect. Yet this requirement was advanced at the 26th CPSU Congress, whose decisions noted the need "to increase to the optimal limits the unit capacities of machines and equipment with a simultaneous reduction of their sizes, metal-intensiveness and energy consumption and a reduction of the cost per unit of final, useful effect."[17]

The application of the consumer value for evaluating the effectiveness of new technical equipment makes it possible to orient its creators and producers toward the output of highly productive machines, equipment, and technologies, which save on public labor.

FOOTNOTES

1. "Materialy XXVI s"yezda KPSS" [Materials of the 26th CPSU Congress], Moscow, 1981, p 111.

2. See: "On Further Improvement of the Economic Mechanism and Tasks of Party and State Agencies," Decree of the CPSU Central Committee of 12 July 1979. "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Improving the Quality of Work," Decree of the CPSU Central Committee of the USSR Council of Ministers of 12 July 1979, Moscow, 1979, p 15.

3. See: "Politicheskaya ekonomiya" [Political Economics], ed. by A. M. Rumyantsev, Part II, Moscow, 1976, p 199.

4. "With Belief in the Force of Labor, in the Country, the People and the Party," KOMMUNIST, 1981, No 6, p 6.

5. Medvedev, V., "On Factors in Socialist Production," VOPROSY EKONOMIKI, 1979, No 11, p 8-9.

6. Marx, K., Engels, F., "Soch." [Works], 2d ed., Vol 46, Part I, p 408.

7. Ibid., p 358.

8. Op. cit., Vol 47, p 363.

9. Op. cit., Vol 23, p 402.

10. Ibid., p 399.

11. "Materialy XXVI, s"yezda KPSS," p 110.

12. See: Marx, K., Engels, F., "Soch." 2d ed., Vol 25, Part I, p 288.

13. See: Marx, K., Engels, F., "Soch." 2d ed., Vol 23, p 403-404; Marx, K., Engels, F., "Soch." 2d ed., Vol 26, Part II, p 612.

14. Kolyada, A., "On the Correspondence of Principles and Methods for Determining the Economic Effect to the Nature of Scientific and Technical Progress," EKONOMICHESKIYE NAUKI, 1980, No 12, p 34-35.

15. Kats, A., "On Dynamic Optimization of Socialist Economic Development," KOMMUNIST, 1977, No 11, p 52.

16. It is desirable to reflect their measurement in the immanent measure--units of labor.

17. "Materialy XXVI s"yezda KPSS," p 144.

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WORK FOR INCREASING EFFECTIVENESS OF SCIENTIFIC RESEARCH

Tashkent EKONOMIKA I ZHIZN' in Russian No 8, Aug 83 pp 19-21

[Article by Kh. Normuradov, secretary of the Samarkand Obkom of the Communist Party of Uzbekistan: "The Scale of Research"]

[Text] The implementation of the economic and social tasks of the soviet society, the acceleration of the changeover of the economy to the path of intensive development and the increased efficiency of public production are inseparably linked today to further development of science and technology. "The country critically needs," it was emphasized at the 26th Congress of the Communist Party, "for the efforts of a 'large science,' along with the development of theoretical problems, to be concentrated to a greater degree on solving the key national economic problems..."

Samarkand Oblast now has a significant scientific and technical potential. It has almost doubled during the past ten years. During the years of the Tenth Five-Year Plan alone, 30 new departments were organized, as were a number of problem and branch scientific research laboratories. A significant material and technical base was created for effective scientific research. At the present time in the VUZ's and scientific research institutes of Samarkand, there are more than 100 doctors and 1400 candidates of sciences. The VUZ's of the city graduate specialists in 62 specialties.

Questions of increasing the effectiveness of scientific research and strengthening the link between science and production are constantly in the sphere of attention of the oblast party organization. A specially developed plan of concrete measures concentrate the efforts of scientists on solving those national economic problems which were earmarked as key problems by the 26th CPSU Congress and the seventh Plenum of the Communist Party of Uzbekistan, which was held in September of last year.

The advanced system of organizing scientific research work, which provides for successful development of fundamental scientific research work and high economic effectiveness of applied developments, took form in the Samarkand Order of the Labor Red Banner State University. Here they achieved high concentration of scientific forces and material and technical means for solving the most important problems that arise from the needs for economic,

social and cultural development of the republic and the oblast. To this end we have revised the long-range and annual plans for scientific research work and carried out a changeover from the narrow departmental principle of planning to the special-purpose program principle, and we have eliminated numerous less important subjects.

The scale of scientific research of university scientists is convincingly shown by the fact that during the past two years in Samarkand, there have been all-union scientific-theoretical conferences on nuclear spectroscopy, cosmic rays, the chemistry and biochemistry of prophyrines and an international seminar of the USSR and the FRG on laser spectroscopy, for which the collective of the university received the thanks of the president of the USSR Academy of Sciences, A. P. Aleksandrov.

Eminent science schools have taken form in the university. One of them is known in our country and abroad for its serious research in optics, spectroscopy and luminescence, which has been introduced into the practice of the leading scientific research centers of the country. Suffice it to say that the introduction of the work performed by the univeristy's optics department in conjunction with the physics institute of the USSR Academy of Sciences has produced an annual economic effect of 2.5 million rubles.

In order to concentrate the scientific potential and increase the importance and effectiveness of research work in the area of physics and to accelerate the introduction of the achievements of science into the national economy, the university has organized a scientific research physics institute on a public basis. It includes four divisions: optics and spectroscopy, nuclear physics, solid state physics and theoretical and mathematical physics, which join together fourteen laboratories, including the problem laboratories for optics and cosmic rays, and eleven laboratories for economic agreements. The volume of scientific research work performed by the institute amounts to almost 60 percent of the overall volume of scientific research work that is conducted in the university.

The university's biology is in the vanguard of science. It is difficult to overestimate its assistance to agriculture.

Workers of the problem laboratory for trace elements, under the leadership of professor M. A. Rish, have successfully conducted work for studying the biological role of trace elements in industrial animal husbandry.

Research is being conducted successfully for the introduction of new, highly productive feed plants: rosin-weed, colewort, cousinia, Jerusalem artichoke and others. For example, the productivity of cup plant with two mowings amounts to 1700-1800 quintals of green mass per hectare. This is 18,000 feed units per one hectare while alfalfa produces a maximum of 5000 feed units. At the present time in Samarkand Oblast production research on new feed crops is already underway.

A number of kolkhozes of the oblast are doing highly effective work for introducing differentiated norms for fertilizers for cotton. During the past five-year plans, under agreements, 4.5 million rubles' worth of scientific research work was done, and 3.2 rubles' worth was done during the two years of the current five-year plan. Twelve projects have been introduced into the national economy.

The collective of the Order of "Badge of Honor" Agricultural Institute imeni V. V. Kuybyshev subordinates the subject matter of all of its scientific research to the requirements and demands of agricultural production. In recent years the institute has acquired the latest scientific equipment for many departments and opened up branch scientific research laboratories entitled "Processing of Agricultural and Industrial Wastes for Feed Purposes," "The Development of Methods of Fighting Against Barrenness and Infertility in Animal Husbandry," "The Development of Scientifically Substantiated Measures for Fighting Against Salmonella and Escherichiosis in Hogs Under the Conditions of Industrial Hog Raising," and also a central scientific research laboratory.

During the past five-year plan, the institute recommended for introduction into the national economy 40 developments worth a total of 11.5 million rubles a year, and received five authors' certificates for invention. About 300 professors and instructors are participating in the scientific research. Especially significant problem developments are being carried out by professors M. Khusanov, Ye. P. Gorelov, D.T. Abdukarimov and N. G. Shatokhin, the docents D. Ye. Yermatova, S. Yu. Yusupov, and others.

The early ripening, highly productive Zarafshan 1 strain of potatoes which is resistant to degeneration has been submitted for state testing. It is suitable for planting on freshly harvested clumps of earth, that is, for obtaining two harvests. In terms of productivity, the Zarafshan 1 exceeds the regionalized strain, Priyekul'skiy ranniy by 50-55 quintals per hectare, and it also has better taste and culinary qualities.

Scientists of the institute have recommended to farms of the republic more effective antibiotics for preventing and treating staphylococcal infections; they have drawn up a chart of natural areas of hydrophobia on the scale of Uzbekistan, and submitted it to the head administration of veterinary medicine for orientation when conducting preventive measures. They have completed research on preventive and therapeutic methods when there is a concealed disturbance of the protein and mineral-vitamin exchange in dairy cows. They have introduced an industrial method of obtaining Persian lambs from sheep that have been rejected because of old age. The effectiveness of this method at the Kattakurganskiy specialized complex is 400,000-500,000 rubles.

The institute extensively practices the fulfillment of economic agreements for scientific research work. The clients are the republic Ministry of Agriculture, Uzglavzhivprom, the Institute of Microbiology of the Uzbek SSR

Academy of Sciences, the Kattakurganskiy specialized complex for fattening sheep and obtaining Persian lambs, the poultry farms and other agricultural enterprises of Samarkand, Bukhara, Syrdar'ya, Surkhandar'ya, Kashkadar'ya, and Dzhisak Oblasts, and also the Altaysel'mash plant in the city of Rubtsovsk.

At the 7th (1982) Plenum of the Central Committee of the Communist Party of Uzbekistan, it was noted that scientists of the republic who are working in the area of animal husbandry have still not isolated a single generally recognized breed of cattle. The collective of the Agricultural Institute imeni V. V. Kuybyshev accepted this as a justified criticism which directed it toward concentrating all efforts on solving this crucial problem under the current five-year plan.

Interesting developments are being prepared by the institute in the area of improving forms of organization and administration of production on cotton growing and animal husbandry farms of Samarkand Oblast, improving the elements of the system of irrigation farming, improving methods for increasing the production and improving the quality of Persian lamb and goat products, diagnosing and preventing certain diseases of large and small foreign cattle under the conditions of Uzbekistan, and so forth.

An appreciable contribution to the successful implementation of the Food Program is being made by scientists of the Uzbek Scientific Research Veterinary Institute imeni Academician K. I. Skryabin.

The vaccines and serums created here are highly effective in preventing diseases of livestock and fighting against them. Express methods of diagnosing brucellosis of animals have been developed and become widespread in veterinary practice. Group methods of treating animals with therapeutic feeding granules with veterinary preparations which are used against various diseases have made it possible to increase labor productivity twenty-fold.

In this same institute, they have developed methods of processing byproducts of crop growing and nonfood wastes from industry to be utilized in feeds for animals, which greately increases the reserves of feeds in the republic. The method of fermenting cotton stalks, dry corn stalks after the cobs have been removed for grain and grain crop stalks which has been introduced into the republic will make it possible to obtain hundreds of thousands of additional tons of feed for animal husbandry.

The collective of the UzNIVI is faced with serious problems. In order for the institute to solve them successfully, it is necessary to resolve certain issues as quickly as possible. In particular, it is necessary to allot the institute 50-60 hectares of land for providing experimental animals with coarse and juicy feeds. There is also a need to open up new laboratories in the institute: for studying diseases of bees and for studying diseases of fish.

The scientific research of the Samarkand branch of the Scientific Production Association imeni R. Shreder is directed towards solving the most crucial problems of modern fruit and grape growing, the main ones of which are intensification of orchard raising, mechanization of the processes of caring for the orchards and vineyards, the search for effective means of protecting fruit crops and grapes from diseases and pests, and improvement of methods of drying fruits and grapes.

In 1980 the branch's processing division concluded an agreement with the Kiev Experimental Design Bureau of the Institute of Technical Thermal Physics of the Uzbek SSR Academy of Sciences and the Moscow All-Union Scientific Research Association of the Canning Industry and special food technology of the USSR Ministry of the Fruit and Vegetable Industry for conducting research on mechanization of the drying of grapes. The time period of the agreement is 1981-1984. The final result of the work will be the creation of a mechanized flow line for drying grapes and fruits with a productivity of 400 kilograms of final product per hour. The proposed economic effectiveness is 260 rubles per one ton of raisins as compared with sun drying.

The efforts of scientists of the Samarkand State Architectural and Construction Institute imeni Ulugbek are directed toward solving the most important national economic problems in the area of construction and architecture under regional conditions. The facets of their research include the development of new and improvement of existing methods of calculating and planning construction designs of buildings and structures, mechanization and industrialization of construction under the conditions of seismic activity, settling ground and a hot, dry climate; research and development of new construction materials using local raw material; and the study of their physical and mechanical properties.

The Uzbek branch of the International and National Committee on Prestressed Reinforced Concrete Structures (FIP) has been created at the institute.

Under the leadership of professor T. Shirinkulov, doctor of technical sciences, methods have been developed for calculating special engineering designs with a solid foundation, which were utilized in designing the foundations of the main structures of the Syrdar'inskaya and Talimardzhanskaya GRES's, and were accepted for introduction when designing the Kostromskaya AES.

For the first time on the loess settling ground of the Samarkand region, under the leadership of docent A. S. Buslov, pile foundations were introduced. They are made of positioned floating piles and drilled-in end-bearing piles, which produce a significant economic effect and reduce labor expenditures. On the recommendation of the institute, in the city of Pavlodar in the Kazakh SSR, drilled-in piles were used for the first time when constructing residential buildings.

Scientists of the institute have developed designs of outer walls with semiconductor heat pumps which make it possible to regulate the microclimate within the premises, and they have proposed effective slab thermal insulation materials that are based on phosphor-gypsum and production wastes. They have also studied the possibility of expanding the raw material base for producing keramzit on the basis of argillite and aleurolite rock from Dzhisak and Kashkadar'ya Oblasts. The significance of the research on properties of ordinary and super hard heavy concretes and the structures made from them taking into account the time and climate factor in Central Asia, conducted under the leadership of R. A. Mel'nik, is shown by the fact that the results of this research were presented in the form of reports at the Russian section of the 8th congress of FIP in London and the 9th congress in Stockholm.

The progressive forms of organization of scientific research work which are applied here have contributed greatly to the success. For example, the creation of scientific production laboratories directly at the enterprises--such a laboratory is in operation, in particular, at the Dahambayskiy plant for reinforced concrete structures.

In the institute constant attention is devoted to the development of "minor," student science. During just two years the students have received eleven gold medals at all-union competitions of student science projects, and the architects have won diplomas of the first and second degree at the all-union competition in Baku.

Scientists of Samarkand make up one of the detachments of the republic's powerful scientific army. While gratified by our success in this area, we cannot but see that the possibilities of the scientific and technical potential to solve crucial national economic problems are still far from being fully utilized. The more dynamic the socio-economic, political and scientific transformations, the more complex and large-scale the creative tasks that face the country and the republic. And constant concern for developing science, increasing its effectiveness, combining the forces of science and production, and providing for efficient interaction and high responsibility for the final results become an even more important area of party work.

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COMBINED EFFORTS OF SCIENCE AND INDUSTRY NEEDED TO IMPROVE ECONOMIC EFFECTIVENESS

Minsk PROMYSHLENNOST' BELORUSSII in Russian No 6, Jun 83 pp 54-56

[Article by V. Sereda, candidate of economic sciences: "Combination of Efforts"]

> [Text] Under the 11th Five-Year Plan, the rate of renewal of technology will increase by about 1.5 times. For this reason, it is very important to assure effective use of scientific achievements and strengthen the tie between science and industry. As shown by statistics, the economic effect of scientific developments is considerably greater than obtained in industry as a result of implementing measures to use new technology.

In 1971-1981, in our republic these indicators were as follows. The number of measures referable to new technology increased by 2.1 times and the their economic effect increased by 2.7 times. However, the effect per ruble spent was 2.6% greater in 1971 than in 1981. In the same period, there was a 5-fold increase in number of scientific research projects completed in VUZ's and their economic effect increased by 27.7 times (by 7.4 times when scaled to 1 ruble of expenses). The economic effect of developments achieved by the institutes of the Belorussian Academy of Sciences increased by 83 times (by 70 times per ruble expenses). In other words, science is in advance of industry and sets its pace.

However, by far not all enterprises collaborate with scientific groups. The strength of their contacts is often related to temporary achievements or failures in scientific research and experimental design work. Not infrequently, they depend also on the subjective opinion of specialists at enterprises about the role of some scientific achievement or other. All this indicates that many have not yet understood the main factor: introduction of scientific and technological achievements is not a temporary campaign, but a planned and purposeful process. Those who are in step with life are constantly improving their performance. For example, the tractor builders of Minsk developed the MTZ-80/82 tractor, which is based on 60 inventions, under the 9th Five-Year Plan. This piece of equipment was justifiably recognized as the best. At present, it is much superior to the earliest models in many respects, also because 68 more inventions, which appeared as a result of strengthening the

ties with science and the research of tractor plant workers themselves, in the course of producing the tractor.

Implementation of scientific achievements is sometimes delayed by a primitive idea about science as an immediate productive force. In the belief that it is a part of industry, enterprises demand both recommendations and design developments of scientific groups, as well as refined technologies for manufacturing new products, without displaying any activity with regard to establishing scientific departments or technological design services. For example, in the light industry, there is presently one design division per 10 enterprises, and in the food industry there is only 1 per 30 enterprises. There is 1 experimental and testing division per 10 and 250 enterprises, respectively. In these sectors, there are virtually no enterprises with their own research centers. In essence, they are oriented toward receiving technical innovations from the outside: from ministries, scientific and planning-design organizations, etc. Moreover, no consideration is given there to economic changes that have occurred in the last decades under conditions of scientific and technological progress. Let us recall that, up to the mid 1960's, the state assumed the main burden of technical refinement of industry. Thus, in 1960, 8.8 billion rubles of the realized profits were left to industrial enterprises for the purpose of development of production. Yet the expenses for the same purposes from the national budget were 34.1 billion rubles. This year, in accordance with the plan for development of the national economy of the USSR, the deductions from profits will constitute 151 billion rubles. At the same time, it is planned to allocate 198.3 billion rubles from the national budget. As we see, the financial capabilities of worker groups and the state are growing considerably equal.

At present, the state is taking on the solution to problems that are predominantly of an interagency or regional nature, such as construction of the Baykal-Amur Mainline Railroad, major gas and petroleum pipelines, etc. But the task of technical and technological upgrading of the material base and finished product of an existing enterprise is relegated to worker groups. For this purpose, 40% of the profits are allocated, credit is granted, conditions are provided for the formation of funds for physical incentives, and the right is granted to conclude economic agreements with scientific institutions and technological design organizations.

Science is becoming an increasingly active supplier of recommendations for development of industry. Thus, in 1981, the workers at institutes of the Belorussian Academy of Sciences alone, which constitute 0.4% of all scientific workers in the country, obtained 1019 positive answers to submitted applications for inventions and those of BSSR VUZ's received 1095. Together, they annually complete more than 1000 projects. Their use yields a rather perceptible effect. For example, the use of el'bor [borazon material] for tod manufacture yields an annual economic effect of 6 million rubles, rhizotorfin fertilizer yields an effect of 1.5 million rubles and rotary-wedge rolling--1.3 million rubles.

At the same time, science is becoming the most effective area of application of resources allocated for accumulation [savings?]. For example, while the economic effect of introducing measures for a new technology at industrial

enterprises constituted 0.3 to 0.63 ruble per ruble expenses, it is considerably greater in science, constituting 2.6 rubles in 1981 at VUZ/s and 2.7 rubles in the Belorussian Academy of Sciences.

Design offices and experimental production have been established at scientific institutes of the Belorussian Academy of Sciences and some VUZ's. Their first and foremost task is to develop technological complexes for experiments and testing of research results. After their completion, the research organizations transmit to industry and other sectors instruments, equipment, specifications in the form of single samples or small series. Moreover, at the present time scientific groups carry the results of their research to the level of industrial use, i.e., they design units, conduct experiments to select the most efficient ones and refine technology, and they test analogous types of products. As an example, we could mention the scientific-production association of powder metallurgy and the academic scientific-engineering association of the Institute of Mechanics of Metal-Containing Polyer Systems of the Belorussian Academy of Sciences. In time, their experimental plants, which are under construction, will provide machine builders with samples of production sections. The enterprises of other sectors should make more active use of the existing opportunities, develop their own research centers and design organizations and introduce on a broader scale the scientific advances into practice.

A good example, in this respect, is shown by the BelavtoMAZ [Belorussian MAZ Automobile Plant] production association. There, 5 design offices, 13 scientific research laboratories and 2 experimental plants have been established, i.e., it has all of the elements of the "science-production" cycle. Unfortunately, even in this association the scientific element is not adequate. It was necessary to establish contact with 76 scientific research organizations located in 20 cities of our country. In its desire to work in accordance with plans and with a long-range view, BelavtoMAZ is proceeding along the route of establishing educational-scientific-production associations, production-academy and other associations on a voluntary basis. One of them is the UNPO MAZ-BPI [educational-scientific-production association of the MAZ Belorussian Polytechnic Institute]. With its establishment, the volume of scientific research work done by economic agreements increased from 65,000 to 400,000 rubles and the effect, from 140,000 to 1 million rubles. The workers at the research center, totaling more than 1700 people, make broad use of theoretical results of research organizations and advance them to the level of industrial use.

There is an increasing need to establish, develop and activate the work of research departments of enterprises and production associations. And this is understandable. The economic capability of groups depends on how active they are: reduction of cost and growth of profits, funds for physical incentives and wages, as well as demand for products, authority of the group in the sector and region. One should not overlook the fact also that the resources of the state, ministry or agency are limited. For this reason, the groups that have more promising programs and implement them well are given the right to use them. The progressive enterprises make broad use of contractual agreements concerning creative collaboration, many of which subsequently (at the planned stage) become economic agreements. The creative

teams include consultants who are scientific associates. In such groups, there are competitions for achievements and scientific-practical conferences are held at the initiative of scientific-engineering societies, societies of inventors and rationalizers. Commissions for organizing socialist competition, a system of economic and political education, permanent production conferences, groups for scientific organization of labor and other departments are concerned with long-range plans. Of course, many of these steps do not involve fulfillment of planned tasks for scientific and technological progress, but without them these tasks cannot be fulfilled in most cases. Active creative searching, involvement of the engineering community in independent work, will make it possible to outline the prospects and notice what is new. This is very important because new products are usually developed on the basis of inventions.

Unfortunately, such a practice does not exist everywhere by far. At several plants and factories, the production divisions and scientists work without a plan, innovative proposals sit in desk drawers and there is no one to take care of promising matters. Expressly these reasons were largely involved in raising the expenses per ruble of marketable product in some sectors. For example, in industry, they decreased by only 3.5%, whereas in the lumber, wood-working and paper and pulp sectors they increased by 0.3%.

These sectors, which are poorly supported in the scientific respect, show a poor effect from using inventions, from 34,000 to 273,000 rubles per year, whereas in the chemical and petrochemical sectors it constitutes more than 7 million rubles, in machine building and metal working it is 30 million rubles. In order to improve the situation, it is necessary to activate the work of research centers at enterprises and in the sectors, to expand their collaboration with scientific institutions.

For the sake of fairness, it should be noted that not all enterprises have equal opportunities to conduct scientific research. This is not an inexpensive matter. Average expenses per scientific research project conducted by economic agreement constitute 149,500 rubles at the Belorussian State University imeni V. I. Lenin, 126,000 rubles at the Minsk Radio Engineering Institute, 71,300-78,300 rubles at the Mogilev Machine Building Institute, Belorussian Technological and Polytechnical Institutes. Obviously, only the enterprises that have considerable funds collaborate with VUZ's, as well as with institutions of the Belorussian Academy of Sciences.

Many enterprises of the lumber, wood-working, paper and pulp, food, light and local industries are in a different situation. Their monetary resources are extremely limited. For this reason, the need arises to establish sectorial laboratories and regional research centers, on the basis of cooperation of enterprises referable to several sectors, sectorial and intersectorial scientific research centers that do have design offices and experimental bases.

There is also a reserve for scientific personnel. For Example, 78% of the staff of the Mogilev Technological Institute do not participate in work done by economic agreements; this applies to 60% of the staff of the Vitebsk Technological Institute and 78.9% at Grodno University.

The regional research centers could be financed by the sectors that have been granted the right to centralize resources in a unified fund for science and engineering. They could be established "in accordance with a specific problem" (for the duration of the research and introduction of results of scientific research work), based at scientific organizations or enterprises. It would be desirable to return to the forgotten practice of using scientific consultants.

Expansion and improvement of ties between enterprises and associations, on the one hand, and scientists, on the other, would improve the use of inventions, define promptly the prospects of development, permit development of effective plans for scientific and technological progress, and to implement them with success. This would make it possible to link science and industry more closely, both in the economic and organizational respects, to transfer them to the route of intensification more rapidly.

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IMPROVING CONTROL OF SCIENTIFIC, TECHNICAL PROGRESS IN UZBEKISTAN

Moscow EKONOMICHESKAYA GAZETA IN Russian No 33, Aug 83 p 9

[Article by I, Munayev, chief of the subdivision for control of science and technology of the UzSSR Gosplan (Tashkent): "'Sore Spots' in the Association"]

[Text] Improvement of control of scientific and technical progress is one of the conditions for intensive development of all branches of the socialist economy. Uzbekistan has great possibilities of doing this. The republic has many dozens of scientific institutions where 36,000 scientific workers are employed, including almost 1000 doctors of sciences. Each year approximately 400 scientific research developments are completed and submitted for introduction.

But an inspection shows that far from all of them are utilized in production. The return from funds invested in scientific research is inadequate. As a result of an analysis "sore spots" were revealed in this important problem. And one should note first of all the weakness of many links in the chain of introduction of innovations.

An analysis of the fulfillment of plans for new technical equipment by republic ministries, departments and enterprises reveals that developments on a local or branch scale, as a rule, are not promptly introduced. Usually these include the assimilation of new series-produced machines or improvement of technology that are provided by scientific research institutes and design bureaus under economic agreements with the enterprises. As for the large proposals that guarantee a high national economic effect, far from everything is in order here.

Interbranch barriers are frequently the main impediment on the path of the new. For example, engineers of the Tashkent special design bureau for textile machine building have created a machine for pneumomechanical spinning--PPM-120-2. In terms of its technical parameters it is vastly superior to similar sets of equipment. One of the advantages of the machine is that it manufactures strong thread of high numbers. And labor productivity in spinning also approximately doubles with this machine.

The Ministry of Machine Building for Light and the Food Industry has accepted the innovation for series production. But from conversations with specialists in cotton spinning production it becomes clear that "underwater reefs" are impeding the introduction of this superior machine. Not all links in the technological chain are prepared for the utilization of the innovation.

The head engineer of the Andizhan cotton combine, A. Kim, in particular, notes with dismay: "The PPM-120-2 requires more cleaning of the cotton fiber. And our cotton cleaning industry cannot yet provide for such high quality."

There are also a number of unsolved problems in weaving, where the unified technological process requires comprehensive improvement. Only then will the new machine be capable of "proving" its advantages.

But who is capable of solving this difficult problem? At this time there is no such organization in Uzbekistan.

It is obvious that the time has come to think about a scientific and technical complex or about a scientific production association within whose framework it would be possible to carry out an entire complex of scientific research, planning-design and technological developments. This kind of scientific production association is necessary because workers of the cotton cleaning industry are not motivated to change the technological process for cleaning fiber. There is no persuasive justification for changing the technology or, rather, improving it, in cotton spinning either. And yet the new pneumatic loom provides for a significant reduction of the expenditure of cotton fiber per meter of prepared fabric.

The organization of scientific production associations, in our opinion, is at the present time the most effective way of merging scientific and production potential. The experience of a number of scientific production associations of Uzbekistan convinces us of this.

Agriculture in the republic must give a great deal of credit to the Scientific Production Association for Fruit Raising, Grape Growing and Wine Making imeni Shreder. In this association scientific developments are used in practice without impediments.

Scientists of the scientific production association have isolated dozens of new strains of berries and fruits. But to isolate a strain is only half of the matter. The main thing is rapidly propagating it on large areas of the kolkhozes and sovkohzes.

The scientific production association, having experimental farms, nurseries, the necessary technical equipment, and also highly skilled personnel, successfully copes with large-scale assignments. The collective of the association helped to expand the area planted in orchards as a result of assimilating

discarded land--nonirrigated land, mountain slopes and other kinds. To do this it was necessary first of all to isolate special strains of grapes and fruits and to develop agrotechnical devices for cultivating the orchards.

Now, mountain orchards are developing successfully in Uzbekistan, and each year the area planted in mountain orchards increases by tens of thousands of hectares.

The time periods for the introduction of automated control systems have decreased significantly because of the activity of the Kibernetika Scientific Production Association.

The existing structure makes it possible to sharply accelerate scientific and technical developments on request for production. For example, the optimization of operating conditions for compressor stations of main gas lines at facilities of Sredaztransgaz produced a savings of 150,000 rubles. In the Sredazkabel' production assocsiation, as a result of the implementation of suggestions of scientists, the quality and durability of plastic insulation cables increased, and the economic effect amounted to 1.4 million rubles.

Today the Kibernetika scientific production association has essentially become the main coordinating center in the sphere of assimilation of electronic computer equipment in all branches of the economy of Uzbekistan. The first section of the republic automated control system was developed and introduced ahead of schedule.

But not all associations that have been created have yet found their place in scientific and technical progress. Sometimes serious mistakes are reflected in planning, accounting and reporting of work that has been done. Technical and economic substantiation is not always given for scientific research work. There are not enough skilled personnel in the services for scientific and technical information and patent and licensing work. A number of scientific production associations have not created scientific research subdivisions.

Such omissions have a negative effect on the efficiency of the activity of individual associations. For example, the Signal scientific production association specialized in the manufacture of measurement instruments for cotton growing. But for several years the stockpile of scientific research developments has been small here. And it is understandable why: in the structure of Signal there is no scientific research institute and it is extremely in need of one. At the same time, in connection with the problem of improving the quality of raw material, there has arisen a critical need for instruments that determine the qualitative parameters of cotton. As usual, there are not enough of them on cotton growing farms of the republic.

Three years ago another scientific production association, Silikat, was created on the basis of the special design and technological bureau of the Uzbek SSR Ministry of the Construction Materials Industry. There is also

the branch NIIStromproyekt. We are awating cardinal solutions to important problems such as, for example, the utilization of phosphorgypsum and wastes from the chemical industry in the production of construction materials. Several millions of tons of phosphorgypsum are lying in the scrap piles. Scientists suggest using it for manufacturing linoleum, cement and ceramic items.

The branch ministry is called upon to support this initiative and concentrate existing scientific and engineering-design forces on this crucial task in the interests of the matter. Unfortunately, up to this point the Silikat scientific production association is operating in exactly the same way as the former special design and technological bureau did.

In our opinion, it is necessary to orient the activity of the scientific production association toward the fulfillment of concrete and crucial national economic orders. The primary task is to study and develop proposals concerning the development and strengthening of the network of scientific production organizations in the next few years.

11772

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EXPERIENCE IN INTRODUCING ACHIEVEMENTS OF SCIENCE AND TECHNOLOGY

Moscow EKONOMICHESKAYA GAZETA in Russian No 33, p 11

[Article: "Scientific and Technical Achievements--Into Production"]

[Text] In issues 30, 31 and 32 of this weekly we published drafts of the programs entitled "The Collective Contract in Rural Areas," "Collective Forms of Labor Organization. Brigade Autonomous Financing," and "Advanced Experience in Economy and Thriftiness." They were developed in keeping with the instructions of the June (1983) Plenum of the CPSU Central Committee.

Below is published the draft of the program of the course entitled "Scientific Achievements--Into Production (Experience of Leading Collectives in Introducing the Achievements of Science and Technology)" for schools of concrete economics and seminars of the system of economic education. The program envisions the study of the experience of leading enterprises and organizations which was approved by the CPSU Central Committee and the initiatives, patriotic movements and undertakings that originated during the course of the All-Union Socialist Competition for Effectiveness and Quality.

The councils for economic education under the ministries and departments, party committees and enterprises are augmenting the programs with recommendations for study of branch and local experience in accelerated introduction in the achievements of science and technology and, on the basis of this, increased labor productivity and increased production efficiency.

The central methodological council for economic education of workers has asked the organizers of economic training and propagandists to send their suggestions regarding the draft of the program to the editorial staff.

Subject 1. Organization of Accelerated Introduction of Scientific and Technical Achievements

The introduction of the achievements of science and technology is a most important way of increasing production efficiency. The 26th party congress, the November (1982) and June (1983) Plenums of the CPSU Central Committee on the decisive significance of a unified scientific and technical policy for a radical increase in labor productivity. Planning and economic incentives

for the assimilation of highly effective technical equipment and technology at enterprises of industry, agriculture, transportation, construction and the sphere of services. The development of creative initiative of the labor collectives and their utilization of their authority for accelerating scientific and technical progress which is granted by the USSR Law on Labor Collectives.

How does your collective fulfill the assignments of the five-year plan for introducing scientific and technical achievements and increasing labor productivity?

The experience in organizing accelerated introduction of the achievements of science and technology into production. The system for assimilating models of new technical equipment and their introduction into mass production (the experience of the Moscow Automotive Plant imeni Likhachev--ZIL). The organization of work for fulfillment of agreements for creative cooperation of enterprises and academic and branch institutes and VUZ's, and the creation of joint creative collectives. The utilization of the possibilities of the brigade form of organization and stimulation of labor in order to increase its productivity.

The role of scientific production associations (NPO) in reducing the time periods for the development and assimilation of principally new technical equipment (the experience of the NPO VNIImetmash and the Leningrad Svetlana NPO). Effective forms of integrating academic science and production (the experience of institutes of the Ukrainian SSR Academy of Sciences, the Belorussian SSR Academy of Sciences and the Siberian branch of the USSR Academy of Sciences).

The utilization in your branch, association, enterprise or organization of advanced experience in accelerated introduction of scientific and technical achievements.

Subject 2. Experience in Technical Re-Equipment and Reconstruction of Enterprises

The economic advantages of technical re-equipment and reconstruction. Better utilization of the country's production potential. A greater role for technical re-equipment and reconstruction of enterprises in increasing labor productivity, the effectiveness of capital investments, the quality of products that are produced and improvement of working conditions.

The course of fulfillment of assignments for technical re-equipment and reconstruction in your branch, association or enterprise.

Experience in comprehensive reconstruction and technical re-equipment of enterprises. Reconstruction and technical re-equipment on the basis of the introduction of highly effective new technical equipment (the experience of

the Moscow Serp i Molot Metallurgical Plant, the Cherepovets Metallurgical Plant, and the Vilnius Komunaras Plant). Labor cooperation of collectives of enterprises that are reconstructed and construction and installation organizations. Organization of work for increasing the output of products on the basis of technical re-equipment of existing enterprises (the experience of collectives of enterprises of the Ministry of Instrument Making, Automation Equipment and Control Systems). Increasing the output of products as the result of more complete and efficient utilization and reconstruction of production capacities (the experience of the labor collectives of Ivanovo Oblast, the Azerbaijan SSR, the Sumy Machine Building Association imeni Frunze).

How is advanced practice in the construction and technical re-equipment applied in your branch, association or enterprise?

Subject 3. Experience in Introducing Resource-Saving Technologies

The introduction of resource-saving technologies as a constituent part of the acceleration of scientific and technical progress. The November (1982) and June (1983) Plenums of the CPSU Central Committee on economizing on labor resources and considerably reducing the utilization of manual labor on the basis of comprehensive mechanization and automation of production processes. Increasing the discipline and responsibility of labor collectives for economizing and efficiently utilizing labor, fuel-energy and other material resources.

The course of fulfillment of assignments for saving on resources which were earmarked by the plan and commitments for the Eleventh Five-Year Plan, and in the USSR Food and Energy Programs as well as scientific and technical programs.

Advanced experience in reducing resource-saving technologies. The economic and social effect from the introduction of labor-saving technologies. The development of the movement "manual labor--on the shoulders of machines" (the experience of labor collectives of Zaporozhye, Kuybyshev and Chelyabinsk oblasts and the Latvian SSR.

Comprehensive utilization of mineral and other natural resources, the introduction of reduced-waste and waste-free technology (the experience of the Balkhash Mining and Metallurgical Combine, the Ust-Kamenogorsk Lead and Zinc Combine, the Volkhov Glinozem Association, the Novgorod Azot Production Association, the shale industry of the Estonian SSR, and the wood processing enterprises of the Buryat and Ivano-Frankovsk Oblast). Economizing on metal and fuel and energy resources, introducing energy-saving technologies (the experience of labor collectives of the Ural area, Kuzbass and the Georgian SSR, and enterprises of the Ministry of the Electrical Equipment Industry).

The utilization of advanced experience in economizing on labor, fuel and energy and other material resources in your branch, association, enterprise or organization.

Subject 4. Experience in Updating, Expanding the Assortment and Improving the Quality of Products

Acceleration of the rates of updating, expanding the assortment and improving the quality of products in the interests of the consumers. The November (1982) and June (1983) Plenums of the CPSU Central Committee on ways of improving quality, and expanding and updating the assortment of items in keeping with the demands of the national economy and the population. The implementation of measures for increasing the role of standards and certification of products in improving the quality. Simplification of the policy for developing and approving normative-technical documentation, standard models and prices for consumer goods. Increasing the motivation and responsibility of ministries, local soviets, and collectives of associations, enterprises and organizations for updating and improving the quality of items.

The course of the fulfillment of the assignments of the five-year plan for improving quality and raising the technical level of products in your branch, association, enterprise or organization.

The experience of updating and raising the technical level of products. The autonomous financing system of organizing work for the creation, assimilation and introduction of new technical equipment (the experience of labor collectives of enterprises of the Ministry of the Electrical Equipment Industry). The organization of work for creating and introducing new technical equipment and increasing the motivation to assimilate items of a high quality (experience of the Leningrad Elektrosila Association and the Minsk Atlant Association).

The experience of the leading enterprises for improving the assortment and the quality of consumer goods. The study of the demand of the population and planning of the updating of goods. Economic and moral incentives for assimilation of expansion of the production of new consumer goods (the experience of the leading collectives of Moscow, Sverdlovsk and Rostov oblasts, the Podolsk Mechanics Plant imeni Kalinin, and the Krasnoyarsk Machine Building Plant imeni Lenin).

How is advanced experience in updating products, expanding the assortment and improving the quality of products utilized in your branch, association, enterprise or organization?

Subject 5. The System of Study, Generalization and Introduction of Advanced Practice in Technical Improvemnet in Production

Extensive dissemination of advanced experience--a large reserve for intensification of production. The authority of the labor collectives to develop and implement measures for the dissemination and introduction of advanced experience. Planning the utilization of advanced experience. The system of introduction of advanced experience in technical improvement of production

at enterprises and in branches and regions. The role of scientific and technical information, the press and economic education in generalizing and disseminating advanced practice and introducing the achievements of science and technology.

The initiative of leading collectives for creating a comprehensive system for the introduction of the achievements of innovators and technical innovations. The development of a comprehensive system for selection, study and dissemination of advanced experience (the experience of the Ivanovo Worsted Combine), The initiative of labor collectives for developing and implementing on a regional scale the plans for the introduction of advanced technology and scientific organization of labor and administration (the experience of Elektrostal' in Moscow Oblast). The creation and functioning of territorial systems for control of scientific and technical progress (the experience of the labor collectives of Leningrad, Lvov, Donetsk and Novosibirsk oblasts and the Bashkir ASSR.

Forms and methods of studying, generalizing and introducing advanced practice in your branch, association, enterprise or organization, and in your republic, oblast, kray, city of rayon.

11772

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TECHNOLOGICAL REVOLUTION IS OCCURRING IN STEEL SMELTING

Moscow SOVETSKAYA ROSSIYA in Russian 30 Mar 83 p 2

[Article by SOVETSKAYA ROSSIYA correspondents G. Alekseyev, V. Denisov, V. Ogurtsov and I. Filimonov: "Metal Being Designed"]

[Text] In the past year in our country 147 million tons of steel were smelted, of which approximately one third, as has already been noted, was done in the Urals. And nevertheless, this isn't enough. What is to be done? One may, of course, increase the productive forces, yielding more and more metal. But the problem can hardly be solved by extensive means alone. Science suggests another method: to sharply increase the quality of all steel, in order to require less of it, and so that it may serve more reliably and longer.

In the combustion chamber of the contemporary aviation engine the temperature exceeds 1500 degrees: the steel here should melt. But the airplane flies. The engine operates normally. The whole trick is that its components are made from steel to which has been added alloying elements--chromium, nickel, cobalt. They change the physical chemical and mechanical properties.

Such an ability to change the quality of ferrous metals has been known a long time, as has the great diffusion of additives--chromium and manganese--to be more precise, the ferroalloys based on them. But today the approach to alloying has changed radically. It will not be an exaggeration to say that steel smelting is undergoing a genuine technological revolution.

How can the quality of almost 150 million tons of domestic steel smelted annually be raised? The problem, it would seem, is not a complicated one: make it alloyed by common practice. But where can such a quantity of ferroalloys be found? In quality steel there is now a minimum of two to three percent alloying elements. And there are those marks in which more than half the mass consists of additives. For certain types of production it is permissable, but for all--impossible: steel would become almost like gold. Millions of tons of ferroalloys are produced in the country, and still they are in deficient supply.

In the program "Metallurgy of the Urals" the section overseeing the increase in steel quality is highly impressive. Joint research is done by scientists from Sverdlovsk, Chelyabin and Moscow: N.A. Vatolin, academician; N. P. Lyakishev, corresponding member of the USSR Academy of Sciences; B. M. Lepinskikh and

P. I. Yugov, doctors of technological sciences; V. I. Zhukov, E. I. Arzamstsev, S. G. Ryskina, I. V. Ryabchikov, A. S. Dybrovin--candidates of technical sciences.

What do the proposals relating to alloying consist of? In turns out that it is possible to raise the quality of steel, decreasing the added ferroalloys by 100 times! The process thus also changes--microalloying. Close to it in its physical essence is yet another method--modifying additives. Successful experiments are being done at the Nizhnetagil' and Magnitogorsk metallurgical combines.

Without going into details, let us nevertheless try to present the action of the miracle elements. Conditionally, it looks like this. Usual alloying smelts sort of dissolve into the steel, the lion's share entering the crystals. And the most evil enemies of metal--primarily sulphus and phosphorus, are most dangerous of all on the intercrystalline boundaries. Therefore, in the neutralization of harmful admixtures the whole mass of alloying elements does not participate, but primarily that part of it which also is located on the "joints" of the crystallite. Microadditives and modifying additions are another matter. They basically also fall on these intercrystalline boundaries. Figuratively speaking, if the usual ferroalloys go in what could be called a frontal attack, the microadditives act like reconnoitrers, achieving the result not by superiority in numbers, but by a precision "blow."

The reconnoitrers--these are the alloys with alkali-earth metals and rare-earth elements. The industry already produces alloys based on silicon and calcium. Alas, this additive turned out to be expensive, requiring excessive amounts of electrical energy, hand labor and the working by a furnace which does not correspond to contemporary requirements. The demand for such alloys is growing quickly. Instead of silicon-calcium, scientists are suggesting the additives containing barium. Producing alloys with this element is as easy as today's alloys with ferrochrome, ferromanganese and ferrosilicon.

Microalloying changes the concept of metallurgy. The usual method consists of "designing" pig iron and steel with western propoerties. Is a metal necessary which is able to withstand unvelievable heat and unthinkable cold? You use as an additive niobium and pipes of such steel will be reliable in the tropics and in the extreme north. So-called bucket metallurgy has become universal. While up to now it has been considered that in converters, having high speed smelting (25-40 minutes), it is possible to obtain only low grade steel, now this insufficiency is easy to overcome. In converters only the semifinished product is produced. They pour it into special buckets, where it reaches the required condition, reducing by synthetic slags the overall content of harmful impurities, and then adding their alloy additives. And the converters at this time make the new semifinished product, which again they will pour off into releasing buckets. Thus a continuous stream of high quality steel is being formed.

In the section of the program "Metallurgy of the Urals," which foresaw the searches for new technologies for obtaining pig iron, iron and steel, there is discussion also about the production of natural alloying iron powders. Strictly speaking, preparing components from them relates more to industrial engineering

than to metallurgy, but it is in fact metallurgies which are called upon to produce these powders. It is the fusing of articles from powders which, with time, will be increasingly substituted forms of steel and various machined stockes.

Calculations have shown that in the Urals, where fused articles have reached a total flow of approximately several hundred tons per year, although they supply powder to many other factories of the country, its own demand already today comprises not less than 30,000 tons. If it is kept in mind that every thousand will give from one to two million rubles to the economy, and allow the release of tens of machine tools and workers, it isn't difficult to image the overall importance of work in this direction.

And the Perm Polytechnic Institute is one of those basic collectives to which the program entrusts the work. The director of the laboratory, Doctor of Technical Science V. N. Antsiferov says:

"Let us begin using an example which cause the features and primary qualities of powder metallurgy to be popularly underscored. At one of our many subsidiary plants, during the machine working of a component 90 percent of the stock was distilled into filings. By the way, today this is the most acute problem of all of our industrial engineering--superfluous machining which no one needs. And here the component in this laboratory, fused from metal powders (in all 5% waste), was tested at all factory stages and withstood the most rigorous tests. And at the factory itself there was no such equipment yet. Then we took upon ourselves an annual program of producing this component, and the plant at this time took out old machines and put in new--for powder technology.

And another example. It is hardly necessary to explain in what complicated circumstances the powerful Chelyabinsk tractors operate, severely experiencing the North and the rapid construction of pipelines. Thus, it was due to powder metallurgy trying to alloy the bushings of the gear boxes with flint and copper that the motor reserves may be doubled. Now, the tractor manufacturing union is engaged in re-equipping its production. There are not just two such operations, of course. Suffice it to say that the laboratory earns about two million rubles per year.

The showing (for a VUZ laboratory) is too elegant not to pay appropriate attention to it. How do you explain it, primarily? By the fact that the institute long ago evaluated the true worth of the broad perspective in this trend of operations. Here, today, a serious scientific base has been created. In technical equipment, it is not inferior to academic scientific subdivisions. In the collective there are 160 qualified specialists, more than 20 candidates of technical sciences. The laboratory has even what many institutes lack: experimental production, which makes it possible not only to completely refine suggested technology, but also to assist plants in serial production. Thanks to this, the laboratory cooperates very effectively with many plants in the Urals, Siberia and the Far East. To that end, the Perm Polytechnical Institute (primarily its laboratory) is one of the few VUZes which prepares specialists for powder metallurgy.

Thus it is that the "sparks" of scientific searches, begun in institutes and other laboratories in the Urals, have been scattered already all over the country. Powder metallurgy sections are active today in many enterprises in the Urals. It has been suggested that one of the old metallurgical plants be redirected toward the output of powders. In Nytvo the shop is designed for a capacity of six thousand tons of pressed stock per year. Other Ural enterprises may obtain powder, also, without special reconversion. The Chusovskoy plant is even now supplying them in the Ukraine--that same old plant about whose future profile specialists had formed the most contradictory ideas.

Of course, we are far fram having named all the developments, the prospects for which there is no doubt. In the portfolio of every science collective there are numerous and different no less interesting ideas and methods for implementing them. But here is what is troublesome: not all scientists are courageous enough to ensure that their developments will be introduced quickly and completely. Here are the digures: in the Institute of Metallurgy of the USSR Academy of Sciences Science Center alone at the present time uses can be found for tens of serious developments already capable today of returning Ural metallurgy to health.

Of course, the scientists themselves are somewhat guilty in this: at times they do not have enough persistance and certain ideas are not "smoothed out" under factory conditions. The most dramatic form is the almost total absence of an experimental-production base, especially in academic collectives whose developments immediately effect the deep-rooted problems of the field. And tests to verify the new during active production often meet the protest of metallurgists: We have a plan, and there is no place in it for your experiments."

In the office of the director of the Institute of Metallurgy a design mofel of an experimental production base has been waiting for 15 years--the planning has begun, but it is not known when it will be finished. But if it were today, the problem would only be partially solved. It would still be an institute rather than a plant production section. But in the Urals there are numerous old plants whose fates are unclear even to the leadership of the Ministry of Ferrous Metals--whether to close or renovate them. Thus, if even one were given to the scientists, they could search for, test and develop ready-made solutions to be transferred to other enterprises. But the ministry, judging by all, fears to part with even the poorist of its plants. However small its capacity may be, with chronic underfulfillment of the plan even here some amount of metal may be obtained bo "improve the reputation." But what are these pitiful tons in comparison with the country's colossal losses being turned around by scientific developments?

Departmental walls often "prop up" incomplete economic stimuli. The pipes of a northern factory were needed for semi-diesel engines in western Siberia. Scientists helped increase the quality of the steel for the pipes. But it turned out that this worked to the disadvantage of the metallurgists: their expenses grew, but the price for the product remained the same.

A worse business yet is the production of ferroalloys containing barium. In essence, already, today, the possibility exists to mass produce these wonder additives. But plants continue planning the production of the usual ferroalloys. If they changed to the manufacture of the new, highly effective alloying elements, this would lower the gross index. This is what ferroalloys faces. Even though it is obvious to all that an operation must be evaluated in terms of the final economic result, and that it is incomparably higher with microalloying.

There is, alas, one more far from happy "discovery." Scientific developments which have not had a production test are not considered complete and not taken account of in long range plans. This is inherent in full measure in the special composite program "Urals Industrial Production Intensification Program," projected for the period up to 1990. After approval, it will become a component part of the state plan for economic and social development of the country and will be ensured the necessary means and resources. Alas, many developments which lack only one stage for completion--practical testing--are not included. Therefore, it is obvious that corrections to the program in the future are unavoidable. When exactly? This is not an idle question. To answer it accurately, means in essence to speed up or slow down the development of the field. And here everything depends on the extent to which efforts of all the participants in the existing complex of scientific research programs are successfully coordinated--from the academic laboratories to plant shops.

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ACADEMICIAN VELIKHOV TALKS ON COMPUTER TECHNOLOGY

[Editorial Report] Moscow DOMESTIC SERVICE in Russian at 0910 GMT on 30 August carried an 18-minute interview by Moscow Radio correspondent Andrey Zelentsov with Yevgeniy Pavlovich Velikhov, vice president of the USSR Academy of Sciences. The time and place of the interview are not given.

In his introduction to the interview, the unidentified announcer says that in a recently-published decision, the CPSU Central Committee and USSR Council of Ministers had defined as "one of the chief goals of scientific work the widespread automation of technological processes on the basis of application of automated tools, machines and mechanisms, unified models of equipment, robot technological complexes and computer technology," a goal requiring increasingly improved provision of data. The announcer adds that in light of this, a decision had been adopted to establish a new department within the USSR Academy of Sciences: the department of computer science, technology and automation. The purpose of the interview with Velikhov is to talk about the role that the academy is to play in setting up the scientific foundations and guiding the new scientific and technical trend.

Academician Velikhov begins by giving the background to compueter science in general terms, and briefly summarizes the history of computers and their use in processing mathematical models in modern technology. He says that "computer technology is becoming accessible to every inhabitant of any country with a national electronics industry. Today there are practically no reasons why every inhabitant of the Soviet Union should not have his own computer, one with a good memory which one can use to plan and calculate. I do not think that today it is a matter of being able to go into a shop and buy one--it would be a bit expensive, after all. In schools and institutes, however, where education is to be obtained, it can be used as an educational aid, a very active one for schoolchildren and students; and, of course, simply as a means of intellectual labor.

"Further, a very broad range of professions can make use of computers. Forecasts indicate that by the 1990's they will be just as common as a television set. It is another question whether they will be in personal use, for, on the whole, different countries go different ways. France, that is to say, is basically taking the path of public use. I think that we are to be a considerable degree taking the path of public use of these computers. They will, however, be at the disposal of all--you will have one, working in radio, you will edit your text on it. There will be computers in shops, collective farms, factories, in the transport system and at the disposal of economists."

Zelentsov then asks about having one in every apartment where there is need for one, to which Velikhov replies: "It is not so simple. In an apartment, I think it should be something along the lines of a telephone, and it should basically be a system through which one can get information, information you need, like booking tickets, weather forecasts, inquiries and so forth.

Zelentsov: "And what about data from libraries and inquiry centers?"

"Velikhov: "This is a very important aspect. Such a state system should be set up. As to whether it will be needed in every house, well, it must be understood that not very many people work at home, but of course such a system will be necessary to those who do wotk at home. Today micro-processors cost just a few rubles--the core, that is. The machine on the basis on which one can use this microprocessor, of course, is not at all cheap." Velikhov explains about microprocessors and likens this mass revolution to that of the invention of the telephone. Velikhov then summarizes the opportunities offered by computer data banks and archives to various professions.

He says that the situation in the Soviet Union in regard to data processing "is by no means as good as it might seem," and that there is now a change to establish computer science on a new qualitative and quantitative level which must be seized. "Since it is a strategic sphere that determines both industrial potential and high labor productivity," Velikhov says, "it demands a particularly acute sense of responsibility;" since it is based on a very advanced degree of technology, a non-ministerial department such as the Academy of Science is of vital importance.

Velikhov summarizes the very rapid development of computer technology, and says it is a very large industry: "We consider that we have our own national industry, a radio industry, an electronics industry. And we do have our problems, our difficulties, so to speak, in this sphere; but it is very important that this should all have a unified scientific basis. Another important aspect is that of a single language, so to speak, a single standard." Velikhov stresses the importance of scientific management of this sphere, hence the establishment of the special department of the academy.

Velikhov explains how computers are used in automation in industry, and how design departments rely on computers to formulate mathematical models for this, concluding that the Academy of Sciences is today tackling the tasks of most importance to the state: computerization and raising labor productivity are among these.

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GEORGIAN 'SCIENCE/PRODUCTION' INTEGRATION DISCUSSED

[Editorial Report] Tbilisi KOMMUNISTI in Georgian on 16 April 1983 has a 1700-word front-page editorial on Georgia's efforts to integrate science and production more effectively in light of the relevant plenums on this topic and with reference to the work of the Republic Coordinating Council for Science and Scientific-Technical Progress, headed by Shevardnadze. There is considerable focus on the efforts of the Academy of Sciences, which recently held its annual report meeting. Some fruitful forms of partnership are discussed: "For example, last year a branch of Moscow's big Volna Scientific-Research Institute was created in Tbilisi, based in several laboratories and departments of the Georgian Academy's Cybernetics Institute, and it has been decided in principle to set up a Tbilisi Scientific-Reserach Institute based on several departments and laboratories of the Cybernetics Institute, to be subordinate to the Georgian Academy of Sciences." Although this kind of partnership has yet to live up to its promise in all cases, "the efforts of the P. Melikishvili Institute of Physical and Organic Chemistry are exemplary. The institute drew up a partnership agreement with the Kaspi Rayon Agroindustrial Association, the Avtotekhsluzhba Association, and the Volga Motor Vehicle Plant, and plans call for agreements with the Gardabani and Aspindza agroindustrial associations." Much of this work contributes directly to the Food Program. Among other shortcomings in the overall effort, the editorial laments that officials of enterprises, associations, trusts, and other industrial and agricultural outfits have hardly responded at all to the "Open House Days" held the last Friday of every month to enable visitors to acquaint themselves with innovative research and development in the Academy's various institutes and departments.

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GEORGIAN INSTITUTES NEED STRONGER EXPERIMENTAL DESIGN BASE

[Editorial Report] Tbilisi KOMUNISTI in Georgian on 8 July 1983 page 3 carries an 1100-word piece by Georgian Academy Corresponding Member L. Oklei, a deputy chairman of the State Science and Technology Committee, on factors which impede efforts to integrate science and production and thus boost productivity. He points out that scientific-research institutes in Belorussia and the Ukraine have done this quite successfully. In Georgia, efforts are scattered, and structural improvements are needed in the general framework of scientific-technical programs. In particular, the Academy's institutes are hampered by the lack of experimental design and technology units. For this part, industrial outfits require expanded experimental facilities. The funding of units involved in practical a-plications averages 60 percent in wages--the norm is closer to 30 percent--and at that most personnel do not have a higher education. The author also calls for more multiple-purpose scientific equipment centers for pooled use in order to enhance integration. Research-production partnerships are also mentioned.

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BRIEFS

NEUTRON PHYSICS CONFERENCE--Current problems of present-day neutron physics were examined by the participants of the 6th All-Union Conference which has ended recently in Kiev. Scientists from Moscow, Leningrad, and union republics, and physicists from Bulgaria, Hungary, the GDR, Italy, the DPRK, Cuba, Mongolia, Poland, Czechoslovakia, and the FRG attended the conference. During the discussion on the results of theoretical research and applied works, the idea was voiced that the atom should exclusively serve the cause of peace. The need was stated for expanding cooperation among physicists living in various countries. [Text] [KIEV DOMESTIC SERVICE in Ukrainian 6 Oct 83] 0730

PHYSICAL CONFERENCE IN KIEV--Non-linear and turboprop processes in physics were on the agenda of the Second International Conference that opened in Kiev on 10 October. Participating in it were prominent Soviet scientists and their colleagues from the socialist countries, as well as from Great Britain, Belgiu, India, Italy, and the United States of America. [Text] [KIEV COMESTIC SERVICE in Ukrainian 10 Oct 83] 0159

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